WORK

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FOR ALL WORKMEN, PROFESSIONAL AND AMATEUR.

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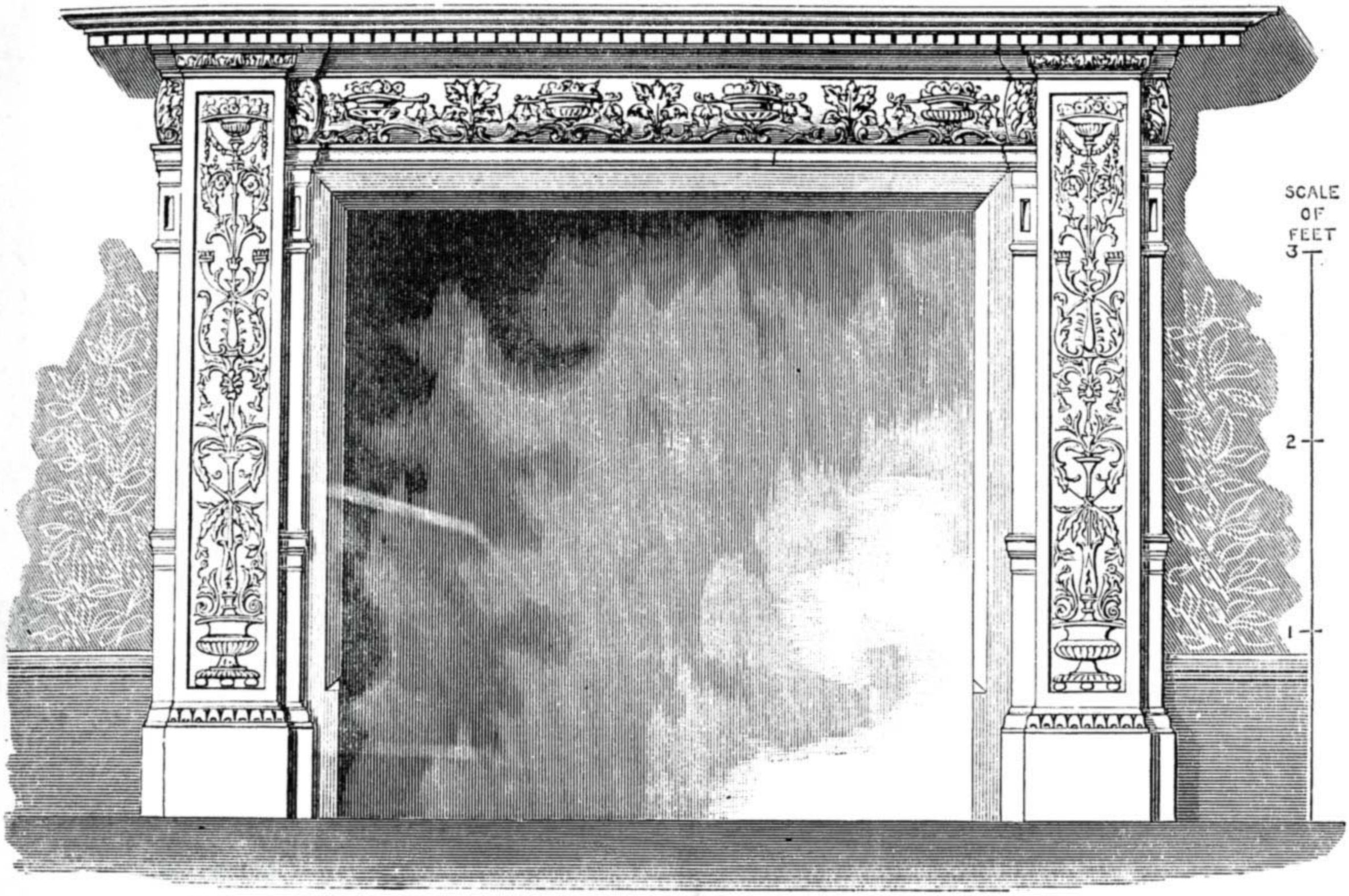

Fig. 1.—Design for Mantelpiece enriched with Carvings in Italian Renaissance. (Scale, $\frac{1}{12}$th full size.)

A MANTELPIECE WITH ITALIAN RENAISSANCE CARVINGS.

BY ALEXANDER MARTIN.

GENERAL DESIGN—CARVING ON PILASTER.

THE design illustrated in this article is principally intended for the display of some nice Italian Renaissance carvings; but, apart from the carvings shown, this same design would, with very slight alteration, form a chaste little mantelpiece. For the benefit of those who would prefer it in its plainer state, the slight alterations referred to shall be fully entered into further on. It is usual, also, to have an overmantel made along with a mantel of this sort, and, provided the Editor accords permission, I will give an Italian Renaissance design by-and-by that will be suitable for placing above this mantel, as well as being suitable by itself for any ordinary room. In the meantime there is sufficient work in what is here shown to keep most wood-carvers busy for some time.

Such a mantel as this would be best suited for execution in American walnut, or mahogany with very little figure in it. The plainer the figure of the wood for the carvings and mouldings, the better; although in the plain surfaces of the base, etc., some little figure would not come amiss. Another point in regard to the wood is, that it should be of a very close grain, in order that the delicate lines of the carvings may not be interfered with.

There is so much carving to be done in this job, that if the mantel were begun by a cabinet-maker in the usual way, after he had the different parts ready for carving, he would be unable to get on for want of these pieces. So it would be as well to get the pilasters carved before the making of the mantel be begun. Each pilaster measures 4 ft. 2 in. long by 6½ in. wide, and is 1 in. thick. At the top end there will be four inches covered with the bed moulding under the mantelshelf, and at the lower end seven inches will be covered with the base, so that the rest of the surface is what will be seen after the mantel is finished. The pilaster is not set in as a panel, observe, but is placed against the framing of the mantel-jamb. There is, therefore, 3 ft. 3 in. clear space left for carving; and in Figs. 2 and 3 is given the design for one pilaster, the other differing slightly in various points from this one. I may here say that in Renaissance work there is a greater amount of freedom to be had than in almost any other style of ornament. Simple floral lines; grotesque arabesques; conventional treatment or natural treatment; flowers, fruits, animals; the human figure itself—all seem to be pressed into its service indiscriminately. It fairly revels in all sorts of ornament; and, not content with even that amount of liberty, it also delights in having every panel, pilaster, frieze, bracket, or corbel, differing from its neighbour. This is, perhaps, its most agreeable feature—this balancing of pattern without necessarily having one feature a duplicate of its corresponding one. There is such an agreeable and interesting discovery in every fresh

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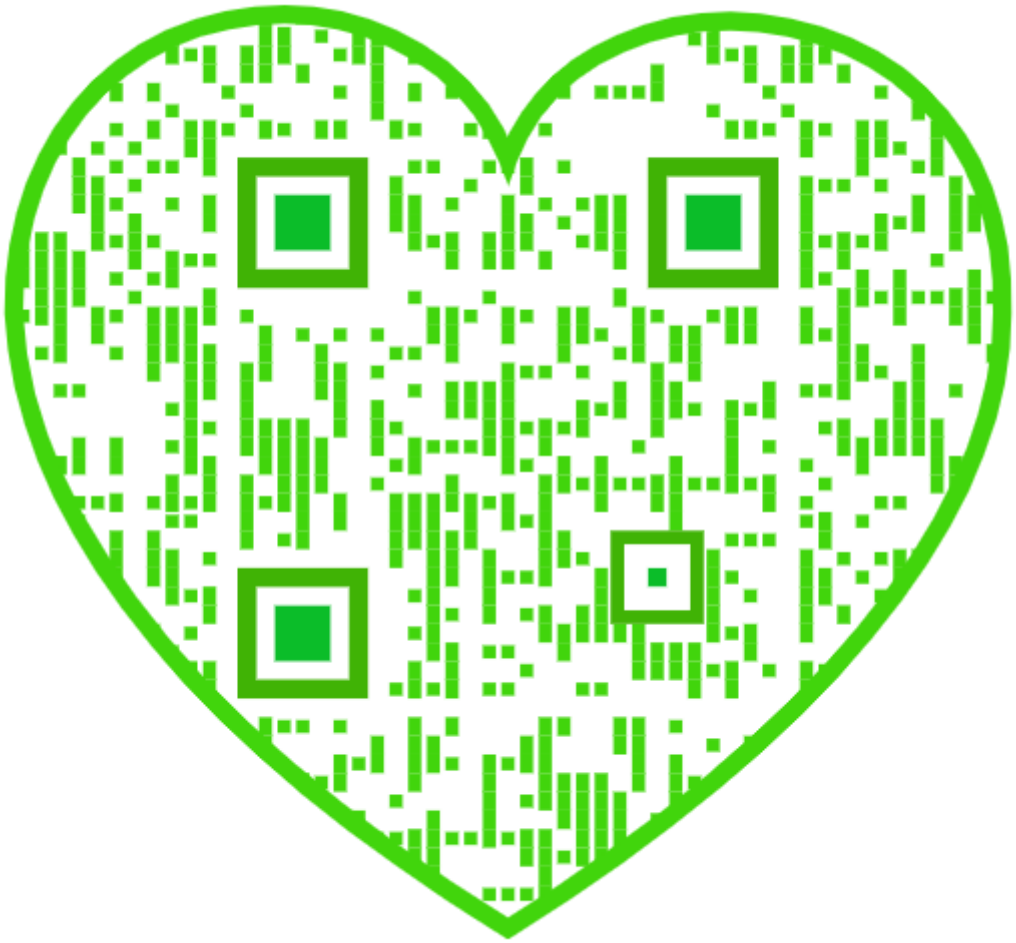

panel when examining Renaissance work, that one is tempted to go on and on, ever delighted with fresh arrangements of the well-known forms, and novel introduction of more uncommon ones. Such a delightful change it is from the stiff, severe sameness of classic architecture, where the same details are repeated over and over again, without the slightest apparent effort to get out of the old well-worn rut.

Well, the design of pilasters in Figs. 2 and 3 is drawn half full size; and for the sake of clearness, as it was impossible to get it all in one length, the two diagrams overlap each other by about half an inch; this will readily be observed in the pattern. The cutting is, in this style, very flat, or in "low relief;" the ground will not be more than a quarter of an inch down from the face of the wood. As much modelling as possible may be put into the work, but it always is very flat, and the ground should not be pounced, but left quite smooth.

As a matter of convenience for readers, as well as for reasons of a purely technical nature which need not be entered on here, Figs. 2 and 3, which together fill an entire page, have been placed in page 317.

THE ART OF GRAINING.

BY A LONDON DECORATOR.

Graining Oak in Spirit Colour and Water Colour.

The methods of imitating figured oak which I now purpose describing, although neither so durable nor popular as the oil-graining process, are well worth the attention of the practical grainer and the aspirants thereto amongst my readers. The nature of oil graining colour we know to be similar to ordinary oil paint—so far as the *drying* or oxidisation goes. In both mixtures the oil hardens into a film, or "skin," of a horny nature, and this action, however it may be properly accelerated by drying agents, should never be forced to completion in less a period than eight hours of fair weather. If oil colour is made to dry in much less than this time, the work must suffer in respect to durability; whilst in manipulating the colour the grainer is unduly handicapped. The interval of a proper period of time, for external work especially, between the various coatings of white-lead paint, the graining, overgraining, and final varnishing of oil grained oak, is a matter of much importance, and although the writer would scarcely advise fixed and arbitrary times between each coating or process—as advocated by some experienced grainers—it is very necessary that the worker should thoroughly realise the difference between paint which is only *surface* dry and that which is *hard* "*right through.*" With these considerations in one's mind, it follows that painting and re-graining woodwork in oil should be a work extending over seven to fourteen days. This length of time for a single door would often make it a prohibitive work; and, as in some cases, if a master had to send his man a long journey, the time occupied by going and coming so many times would be greater than that required for the work. It is customary in most places for a plain painter to prepare and *ground* the door for graining; and if the usual two preceding coats are sufficient, then it is possible, by graining the door in one of the methods under notice, for the worker to both grain and varnish upon the same day, and that without any detriment to the job, or so much dependence upon the atmosphere.

The advantages of graining oak in spirit colour go further than this time-saving paint of convenience, however, for another distinctive feature of such a quick drying imitation is the small risk of it getting "smudged" or rubbed off by the passer-by. In the densely-packed thoroughfares of Newgate Street, Cheapside, and similar central spots of London and the other large cities, the friendly warning of the white chalk markings would be very quickly obliterated from the pavement; whilst the "push and scramble" method of pedestrianism that the busy man must adopt makes it impossible to trouble about such minor affairs as rubbing the grainers' work.

The nature and preparation of spirit graining colour are best explained together. The chief feature of the mixture is the, necessarily, entire absence therefrom of linseed oil in its native condition, and, generally, in *any* form. The term "*spirit colour*"—a misnomer—is derived from the fact that the volatile *oil of turpentine* is the chief fluid, or solvent, used in the mixture. Turpentine alone, although containing a small proportion of resin, is not in itself a binding or fixing agent, so that this latter property must be added in the form of varnish. In mixing spirit graining colour, all ordinary conditions of manipulation are sacrified to the chief object of obtaining a very quick drying process. The best varnish to use is, therefore, a so-called *spirit varnish:* viz., one in which turpentine is the solvent. There are several kinds of varnishes made on this basis suitable for the purpose; the most reliable is that known as white hard *Bath varnish.* It is very necessary here to point out the entirely different natures of the above and the ordinary "white hard" spirit varnish; the latter, having methylated spirit as the solvent, is utterly unsuited for the purpose under notice. The proportion of spirit varnish to turpentine is more a matter of each circumstance than of rule; but a maximum of *one* of varnish to *three* of "turps" may be taken as a basis of computation. Although we must still, theoretically, look upon the graining colour as a *stain*—viz., a translucent fluid—it is necessary to add a little body to the liquid, as well as the pigments or "stainers." This is best obtained with the aid of a little whiting. "*Gilders'*" whiting implies the best and finest washed quality, and this should be used when possible. If free from moisture, it will be readily amenable to the palette-knife, and should be well rubbed up into a paste by the aid of turpentine. This whiting paste is now stained to the proper colour by the aid of such grainers' pigments as raw or burnt sienna, raw or burnt Turkey umber, and ivory black—the latter ground in "turps," and the others "in oil." Lest the proportion of whiting should trouble the worker, I may point out the similarity between the required quantity of this and the amount of patent paste driers that one would use—but for a different purpose—in compounding oil graining colour: a few ounces to the pound, or pint, in both cases. Whiting and pigment being mixed together, and the required colour obtained, the varnish should be then introduced, and well incorporated with the former in the pot, and the turps finally added and well stirred. Before starting the work, it is well to test the colour for *binding* qualities. Should the fluid, when dry, not bear *fair* rubbing, a little more varnish is required; whilst if it has any decided gloss when dry, it will stand diluting with more turps, and will also spread more satisfactorily therefrom. Experience and practice will, after one or two essays, give the grainer all confidence in his proportions and mixing, providing pure turpentine and a varnish of the same strength and nature are always used.

Although the above varnishes are the best and most reliable for durability and quickness of drying, copal oil varnish or Japan gold size may be substituted for the copal spirit varnish as the drying or binding factor. The ordinary "church oak" varnish would work up a mixture to dry in about four hours, and the gold size would be as quick as any varnish. The latter, however, would not be of so durable a nature, nor would the "church oak" be as quick as the Bath varnish; but if this cannot be conveniently obtained, equal quantities of "japanners'" and church oak will make a good substitute for spirit varnish. Having, in the preceding paper, exhaustively treated "grounds," graining colours, and pigments for oak, the student will readily apply its contents to this process of *spirit graining.* As a matter of very great convenience and economy, I would commend the use of the finest umbers, etc., which are put up in pound collapsible tubes by all the best colour manufacturers. Although about double the price of the ordinary "keg" pigments, which are sold at "per cwt." rates, they are cheaper to the grainer in the long run. For instance, if a grainer had a three-mile walk to reach his one or two doors which he wishes to grain and varnish "right off," his material need only be a little mixed turps and varnish in a can, a small knob of gilders' whiting, his door varnish, and a tube of burnt umber and raw sienna. With these he could grain either light or dark oak, would have good rich colours, and would not want to strain grit and "skins" away before using. Should the worker be compelled to use the common imperfectly washed whiting, it is best to dry it well, and the colour must be strained through fine muslin before being used.

To grain a door in spirit colour no special experience or knowledge is required other than the ability to grain oak in oil, and an intelligent application of the same *principles* to the different natures of the two mixtures. In practice we must treat spirit graining in the same manner as when overgraining in water colour, working it in separate portions. In graining a door, it is necessary to rub in one panel at a time, using a wide brush to quickly and evenly spread the colour, and then putting a slight grain in by drawing a dusting brush down it. A further grain is at once given by using fine and medium steel combs, and the panel is then allowed to set. When all are so treated the mouldings are worked. Although when "rubbing in" the panels the surrounding mouldings may have been brushed with the colour, it will be found that, under the influence of the turps solvent, the parts so touched will soon "rub up" again, and allow us to give an even coating to the whole of them. Whatever the nature of the mouldings, it is best to finish them with a dry brush, streaking or stippling them in a "woody" manner, and making them slightly darker and contrasting to the remainder of the door. In the same way as a door is painted we now proceed with the cross rails and then the stiles, and, as I have pointed out when overgraining the same portions, the joints between rail and stile must be worked sharp and clean. For the process now described, a piece of

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rag dipped into turps and a fine bevel edge lath or a strip of zinc will enable us to wipe the intersections cleanly. Working and combing each division at a time, we are thus able to get almost as much variety and cleanliness as in graining with oil colour.

By the time the framing of a door is rubbed in and combed, the door itself will be dry and ready for veining. It is now that different methods are necessary, for instead of wiping out the graining colour with rag and thumb piece, as in the oil process, we use a veining fitch (Fig. 12, page 40, Vol. II.), and put in the "lights" with a solvent strong enough to dissolve the spirit graining colour wherever we paint it on. In using spirit colour made from spirit varnish and turps, and providing sufficient only of the former is used to bind it, then a solution of common soda is the best and cleanest solvent. This fluid having been prepared the desired strength, a little water-pigment is added to stain it sufficiently for the grainer to follow the brush markings as they are put in. Upon referring to the illustration of veining fitch, it will be seen that the hair is arranged in one tuft of long bristles, broad, but with a thin edge. This is manipulated to get the same broad and narrow effects as are obtained with the "thumb piece" of similar shape. Practice with the veining fitch will, of course, be very necessary before the grainer can use it quickly and naturally. These brushes, which are made in various sizes, are held with the fingers and thumb—like a stick of willow charcoal in sketching large forms. Lightness and delicacy of action are very necessary to put sufficient only of the solvent for our purpose without any superfluity to run down and spoil the panel. When the soda has done its work the door must be well washed down with cold water and dried with a wash-leather.

In using graining colour of a stronger nature, it may be found advisable to use turpentine as the solvent instead of soda water. When this is the case the grainer uses a wide pad of soft flannel, and draws off the turps after making a few veins. The effect of the wiping is somewhat softer than the soda process, and as it is also more convenient, we find it used to a greater extent on the city warehouses than the soda. Turpentine when so used requires to be stained in the same way as the soda water; or the veining may be executed by diluting the spirit colour with more turpentine.

All such work of the average quality must now be overgrained, and this process I have already explained. Should there be any difficulty—as is often the case when overgraining—in getting the water colour to spread properly on our grained work, the simplest way is to sponge it over with beer and water in equal proportions, or to rub it over with a little powdered whiting on a rag. The shading, dapple, etc., can then be put in, and in a short time the grainer will find his work ready for the finishing process of varnishing.

Graining oak in distemper, or water colour, is a process so little in demand nowadays that a brief outline only of the work appears necessary. Since it is but a little, if at all, quicker than the spirit graining, and as it lacks other practical advantages common to the preceding process, there are but a few points upon which to commend it. The raw and burnt umbers are the chief pigments used, and these must be purchased of a superior quality to the common umbers sold in powder form. The pigment being rubbed up in dilute beer, and the desired colour obtained, the mixture is then brushed over a panel. A small piece of damp sponge is now used to wipe off some portions of the colour and give variety of perpendicular shade. A dusting-brush or badger is next drawn down the panel, and a fine grain thus obtained; indiarubber combs may be used for the grain also. For veining, a damp wash-leather is placed over the "thumb piece," and the "lights" and half tones are quickly wiped out and softened slightly with the badger. If the graining colour is used very strong in beer, the work, when perfectly dry, will allow us to put an overgrain upon the first colour. When such is desired, a thin oak overgrainer can be dipped into a weaker solution of graining colour and drawn over the work, as in overgraining oak in oil. It must be borne in mind, however, that if the first colour is rubbed to any extent the grain and figures will be "smugged." Should it be desired to make a sure job of the overgraining, it is advisable to paint over the first water grain with a thin coat of Japan gold size and turps in equal proportions; this will dry within one hour, and the work can then be overgrained and shaded in water with safety. In using distemper graining on doors, etc., the same conditions of working in portions apply as to the spirit graining. For acquiring facility and confidence in wiping out the lights of oak, the distemper mixture is a most useful process to the student; the panel can be rubbed over and grained *ad lib.*, and the absence of smell and substitution of the damp wash-leather for linen rag are both appreciable conveniences to home practice.

Overgraining or "oak graining" metal rollers (see page 272, Vol. II.) are particularly valuable for finishing in good style the spirit-grained work; in such cases the roller grain is executed with water colour, and after the panels are shaded with the brush.

Distemper graining is also used very considerably in finishing cheap furniture. As this is somewhat a distinct line from house graining, and also a subject likely to prove usefully interesting to many readers, I hope, further on, to devote a short paper to this branch.

A LAMP BRACKET IN BENT IRON WORK.

BY OPIFEX.

FEW forms of ornamental work are more useful, and none more effective, when legitimately applied, than artistically wrought iron. It possesses a peculiar charm for every one naturally endowed with that rather rare quality, good taste, and for those also who have been educated thereto; whilst with the great majority who are influenced by Fashion, and follow her whithersoever she leads, this kind of art work is, and doubtless will continue to be, very popular.

The simple example which forms the subject of this paper hardly deserves the name of wrought iron work—that is, if we use the term in its usual signification. Technically, wrought work means forged work, and this, again, implies the rather difficult process of welding (I speak as an amateur). I have, therefore, called this article a bracket in bent iron because not only have I eschewed welding, but even heating is only called into requisition for the forming of the hook. Nevertheless, the bracket may be strong and rigid, and capable of sustaining the weight of a heavy lamp or lantern, and if the directions given be faithfully followed, and the work fairly well done, the result will be very satisfactory.

The first—and, I may say, the most important—step will be to make a full-size working drawing of the work. The whole success of our undertaking depends upon this, and the drawing should be made upon a board of sufficient size, or upon the workshop floor.

The importance of this arises from the necessity of applying the work constantly to the drawing, for by this means only can accurate and satisfactory results be obtained.

With regard to the iron to be employed, I would strongly recommend the use of the best kind from the start, as although, when some experience is acquired, it is quite possible to produce good work with common iron to be had at any ironmonger's, it is much more difficult to manage, and breaks easily, causing disappointment and discouragement to a beginner.

Charcoal iron, or improved iron as it is also called, costs more, and is more difficult to procure—at least, in the country; but the extra expense and trouble are more than compensated for by the quality of the metal, and the comparative ease with which it may be worked.

In the present example, the iron is bent and otherwise shaped while cold, with the exception already alluded to; therefore it is especially necessary to have good stuff, which will bear such treatment.

In case any of my readers should wish for a definite address where this description of iron can be obtained, I may mention that Messrs. Pfeil and Stedall, Broad Street, Bloomsbury, W.C., supply all sizes and scantlings, and in small quantities to suit any worker.

Fig. 1 is a side elevation of the bracket, from which it will be seen that it consists of a framework enclosing a simple scroll, the horizontal arm being provided with a hook, to which the chain which supports the lamp, etc., is attached.

The framework consists of three pieces, of which I give separate illustrations, and we shall commence operations by describing the back piece (Fig. 2). This is of $\frac{1}{2}$ in. by $\frac{3}{16}$ in. iron, the edges being slightly rounded, and, in order to simplify my directions, I give the measurements of a bracket which I have made from this design, and which is now before me. The back is 3 ft. 3 in. long, but, in order to allow for bending at each end, we require a piece about 4 ft. 3 in.

We now come to the most important part of the actual work, viz., the bending of the scrolls. I take for granted that the workman has followed advice frequently given, and has prepared an accurate full-size drawing of the work in all its details, showing each portion clearly defined.

The back piece, then, consisting of a straight bar, 4 ft. 3 in. long, is now to be bent so that it shall correspond with the drawing. To do this, fix a piece of $\frac{3}{4}$ in. round iron firmly in the vice in a horizontal position, and holding the iron to be worked at right angles to the round piece, and close up to the jaws of the vice, hammer the extreme end of the work until the first and smallest turn is made. In the present instance, this should be a semicircle of about an inch diameter. This being accomplished, take an ordinary medium-sized screw-wrench, screw it up so as to fit the flat of the iron rather loosely, fix the iron to be bent in the vice in a horizontal position, and so that the jaws shall grasp it at the point at which the curve is to commence, and, using the screw-wrench as a lever, proceed to bend the iron into the desired shape. This should be done gradually, moving the

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wrench forward by equal distances—say, about ¼ in. at a time, and using a uniform amount of force to each bend, so as to ensure a true curve. I need hardly say that this operation requires some practice, and, therefore, I strongly advise the beginner to make many experiments upon odd pieces of iron before attempting the work proper, but of the effectiveness of the method there can be no doubt, and, with a little experience, any one possessed of average mechanical aptitude will find that he can turn a true scroll with comparative ease.

The direction already given with regard to the first, or inner, turn of the scroll is necessary, because it is not practicable to turn a very small curve with the wrench, but this being done in the way suggested, the vice and wrench alone are required.

The horizontal arm (Fig. 3) requires a piece of iron ½ in. by $\frac{3}{16}$ in. by, say, 2 ft. 2 in.—*i.e.*, 16 in. from the back to the shoulder and 12 in. for the hook. It is secured to the back piece by being mortised—if such a term is allowable in iron work—filing a round tenon and riveting at the back. The hook may be turned and shaped cold, as in Fig. 3; but it will be better to heat the iron and forge a hook something like the alternative design (Fig. 4).

Although I have pointed out that this arm is secured by riveting to the back piece, this should not be done in the first instance, the parts being merely fitted and made to correspond with the drawings, but not put together finally until all the parts of the bracket are complete.

The front stay (Fig. 5) is 26 in. from shoulder to shoulder; the straight portion, which is bolted to the back, is 6 in., and the scrolls take about 12 in., so that we shall require a piece of iron 3 ft. 8 in. by ⅜ in. by ½ in. for this item. The stay may, of course, be made of the same sized iron as the back and arm, but the scantling mentioned will be found quite strong enough, as it is bolted and riveted at so many points that perfect rigidity is secured, and the bracket will not be called upon to sustain any very great weight.

The scroll at each end of this front stay should be carefully bent in true spirals, and the lower one especially should flow gracefully, so as to foliate naturally with the reverse scroll of the back piece.

Having fitted these three parts, which compose the framework of the bracket, the next step will be to mark and bore (drill?) the holes for the bolts, or rivets, by which they are to be secured. Although I write bolts *or* rivets, I suggest that ball bolts be used in putting the bracket together, with the exceptions to be mentioned presently; but, in some cases, the bolts are to be used *as* rivets. For instance, in fixing the lower end of the stay to the back, two ⅜ in. ball bolts are cut about ½ in. from the heads and used as rivets, while the other end of the stay is secured to the arm of the bracket with a ½ in. ball bolt, used as a bolt, the over length being cut off close to the nut and slightly riveted. In case any of my readers have not seen these bolts, I may mention that they are made in various sizes, and their peculiarity is that both head and nut are ball-shaped, and vary in diameter from ⅛ in. upwards.

The holes may be drilled in any way most convenient, a drilling machine or lathe entailing, of course, the least amount of labour; but they should not be made larger than necessary, lest the iron be unduly weakened.

Fig. 6 represents the main stem of the reversed scroll, which forms the "filling" of the bracket. This is of ⅜ in. by ⅛ in. iron, of which it will take 6 ft. 4 in., or thereabouts. The dotted line A B shows that

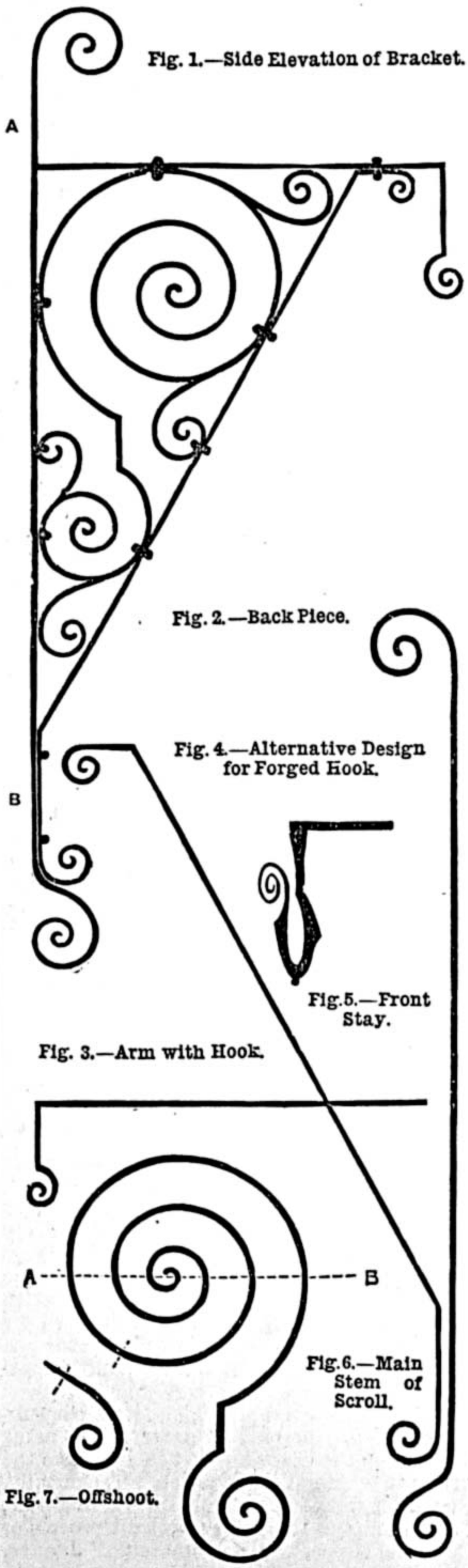

Fig. 1.—Side Elevation of Bracket.

Fig. 2.—Back Piece.

Fig. 4.—Alternative Design for Forged Hook.

Fig. 5.—Front Stay.

Fig. 3.—Arm with Hook.

Fig. 6.—Main Stem of Scroll.

Fig. 7.—Offshoot.

Lamp Bracket in Bent Iron. (Scale, 1½ in. to 1 ft.)

the upper and larger spiral consists of seven semicircles (at least, we may treat them as such), the inner and smallest being about an inch in diameter. This may be turned as before directed, and the rest of the spiral bent with the wrench, applying the work constantly to the drawing, and working round until the smaller reversed spiral is reached, when again the inner semicircle is turned, and then working backward until the whole scroll is completed, according to the design, when, if the work has been carefully done, it will be found to touch the framework of the bracket at five points.

The four offshoots should next be made, as represented at Fig. 1, and one of which is shown in detail at Fig. 7. These offshoots being so much alike, varying only a little in size, and very slightly in shape, it will only be necessary to describe the method of attaching one of them to the main scroll and to the framework. We, therefore, take the offshoot which is largest, and is bolted to the centre of the front stay. This takes about 12 inches of iron, and is, of course, of the same scantling as the main stem.

When shaped accurately according to the drawing, the end which is to be attached to the stem is filed to a thin tapered edge and fitted to the stem so that it may appear to form part of it—or, rather, to grow from it; and when properly fitted, and placed so that it shall also touch the front stay, a hole should be drilled about ⅜ in. from the end at which it is to be attached to the stem, then another corresponding hole through the stem, and the two firmly riveted together with a small rivet made of ⅛ in. copper wire. These holes should be slightly countersunk on opposite sides, and the rivet closely hammered, when the ends may be filed smooth.

Now make and attach the other offshoots in the same way, and having placed the completed scroll in position within the framework, mark all the points of contact clearly on both, using chalk or a coloured pencil. Emphasise these markings very decidedly with a centre punch, and proceed to drill all the required holes in whatever way is most convenient.

All the points of contact at the back of the bracket are fastened up by using ball bolts as rivets, as before described; while all other joinings are effected by ball bolts and nuts screwed up, the over lengths cut off, and the nuts secured by a slight riveting, so that both heads and nuts shall be exactly the same.

In order to provide for fixing the bracket to any woodwork for which it is intended, two holes (countersunk for screws on the outside) should be drilled through the back piece and front stay at A and B, Fig. 1.

The bracket should be painted in flat colour, either black, blue, or chocolate, or a combination of these, or otherwise, according to the fancy of the maker.

BRICKLAYERS' WORK.

BY MUNIO.

UNDERPINNING.

THIS operation consists in excavating the earth from under the foundations of a wall already built, and carrying up a wall from the bottom of the excavation to the under side of the footings. It is generally resorted to when a cellar or basement is to be put in against a wall whose foundation has not been carried low enough. The excavation should be dug out within two feet of the face of the wall to be underpinned, shoring up the earth if it does not stand well, to prevent it falling away from the face of the wall. Then fix a stay against the quoin, and two or three in the face of the wall, keeping the top ends as low as possible, and letting them into notches cut in the wall

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Fig. 2. — Design for Upper Part of Pilaster. (Scale, one half full size.)

PILASTER FOR MANTEL-PIECE ENRICHED WITH CARVINGS IN ITALIAN RENAISSANCE.

For Text, see pages 313, 314.

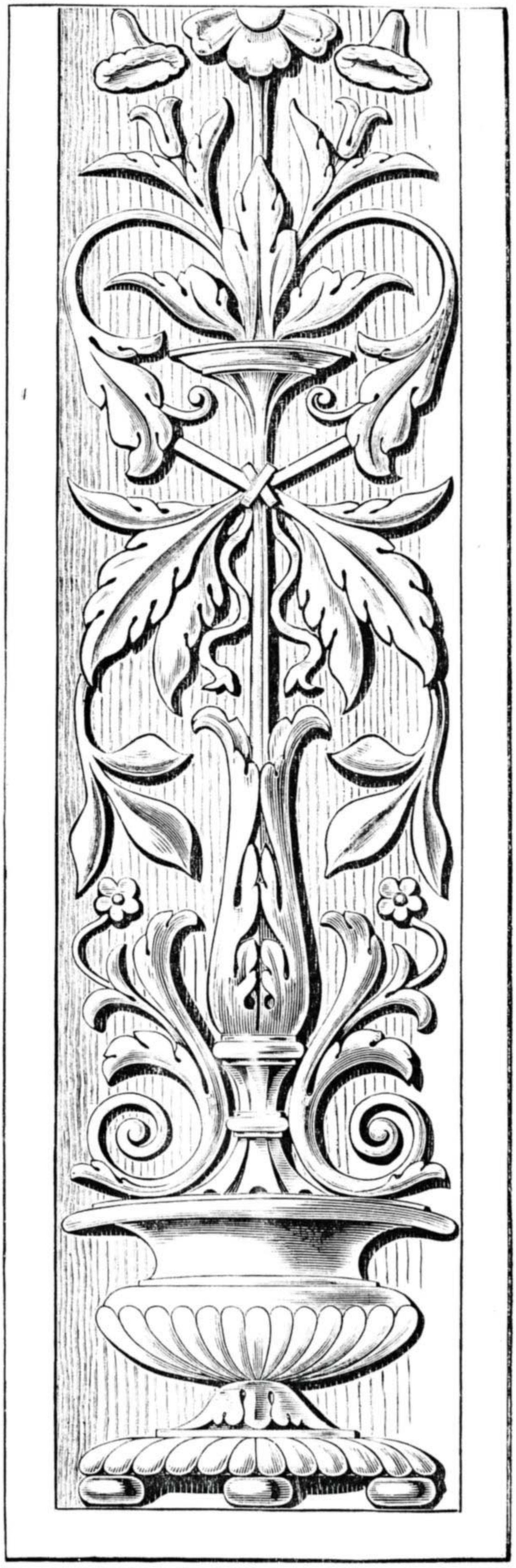

Fig. 3. — Design for Lower Part of Pilaster. (Scale, one half full size.)

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The lower ends must be made good by driving strong posts into the ground.

Then dig out under the quoin for two feet in length and build up with brickwork set in Portland cement, and lay on the top a Yorkshire stone slab about 2 inches below the footings, and wedge up from this slab to the under side of the footings with oak wedges about one foot apart. The wedges should be put in double, the thick end of one upon the thin end of the other, and fill up between the wedges with thin stones or bricks bedded in Portland cement. Then dig out another length of 3 feet, and wall up and wedge as before, and so on the full length of the wall. A longer length than 3 feet should not be dug out at once, and the walling should be carried up as quickly as possible, and should not be left till wedged up. One or two boards should also be fixed under the footings while the walling is being done, to prevent any bricks falling on the workmen. Sometimes holes are cut as low as can be got in the wall, and putlogs put through and wedged up on strong posts to support the wall while being underpinned. Very great care and strong timber should always be used in this work.

Beamfilling.

This consists in walling up the triangular space between the top of a wall and the roof. It is generally done in buildings with open roofs, or such as are ceiled at the collar beam, but would be better if done in all roofs, as it prevents the wind from blowing in under the eaves. The top brick is generally set on edge, the upper edge being bevelled to fit against the roof.

Shoring Up.

When a shop front, or other large opening, is to be made in an existing building, the superincumbent wall has to be shored up till the beam or girder is fixed. Holes are cut in the wall above the level of the top of the beam at intervals of 3 or 4 feet. Through these are laid strong putlogs, under which are fixed strong posts or uprights, and the tops of the putlogs wedged tight in the holes; then cut down the wall at each end, and form the quoins, laying on the top a Yorkshire stone template for the ends of the beam to rest on; then cut out the remainder of the wall, and insert the beam, making good on the top with brickwork set in Portland cement, and wedge up tight with oak wedges. Then remove the putlogs and make good the holes. When the floor joists are not raised, but are level with or below the beam, they will require shoring up, and are hung from the beam in iron straps.

When the floor joists are to be raised, the top side of floor should be cleared, the skirting, fireplace, closets, or any plastering that is in contact with the boards should be removed, then cut the joist holes as far up as the floor is to be lifted, and, with a long lever, commence at one end and lift each joist 3 or 4 in., wedging them up till both sides are raised, and repeat this till the joists are at the required height, when they must be built up solid underneath and wedged level. Sometimes, when the front wall is in bad repair, the whole front is taken out and rebuilt. Each floor must then be shored up, and also the roof timbers. The props should always be set on a large stone or piece of timber bedded solid, so that there is no possibility of settling, and the timber should be sound and good and of ample strength.

Pointing.

The pointing executed by the bricklayer is of two kinds: flat pointing and tuck pointing. Flat pointing is generally done as the work is built, the joints are filled level, and the trowel is drawn along the under edge of the brick, making the joint project slightly outwards, when it is cut off to a rule by a knife turned up at the point $\frac{1}{8}$ in., called a "Frenchman." The joint should be about $\frac{1}{4}$ in. wide. Sometimes the trowel is drawn along the upper edge of the brick, and a jointer drawn along the centre of the joint by the rule. In some places a piece of soft black slate is used instead of the jointer. This is called black lining. Another method is to wall the face work with mortar made black by the admixture of foundry sand. The joints are filled up flush, and when stiff are rubbed with a soft piece of brick. A jointer with a hollow edge is then drawn along by the rule, and forms a bead. This makes very neat work when well done. After pointing, the face of the wall should be brushed over with a soft brush.

In pointing old work, the joints should be well raked out, and any damaged bricks replaced by new ones. Then wash the whole front, fill up the joints with fine mortar, and point as required. The mortar for pointing old work should be darkened by mixing it with sifted smiths' ashes, foundry sand, or lamp black.

Tuck pointing consists in laying a joint of white or black putty, by means of the rule and jointer. In walling a front which is to be tuck-pointed, the joints are raked out. If the work is ordinary red or machine-made bricks, it is generally washed over with a solution of green copperas and water to bring it to a uniform tint—about 3 oz. to a gallon is an average mixture, but it will vary on different kinds of bricks. A portion should be tried, and allowed to dry, before laying it on the front. The whole front should be coloured at once; sometimes a second coat may be required, but the first coat should be allowed to dry before the second is applied.

The stopping for the joints is made of fine mortar, tinted with Venetian red and Spanish brown till of the required colour, but this should also be tried and allowed to dry before being used. It will look best if made a little darker than the bricks; the joints are filled level with the stopping, and when sufficiently stiff are rubbed smooth with a piece of canvas, and the putty joints are laid on by means of the jointer and rule. The joints must be gauged to keep them parallel. The cross joints are laid on by the jointer, using a piece of board cut to the shape of a set square with a handle on the back. The square sides of the board should be about 9 in. long; one edge being laid on the joints already drawn, the jointer is run down the other edge, which keeps the joint square. The rule should have a rebate $\frac{1}{4}$ inch deep by $\frac{1}{4}$ inch on its upper edge, which allows the pieces of putty to fall from the side of joint in cutting. No more stopping should be laid on than can be jointed in a day, as, if left over night, it gets too dry, and the putty won't adhere. The copperas solution should not be allowed to come in contact with the stopping, or it will eat the colour out of it.

The putty is made from white lime which has been squeezed through a fine sieve, and well beaten to get the water out of it. It is mixed with silver sand and boiled linseed oil. A piece is laid on the rule, whence it is taken off by the jointer, and run along the joint; it is then cut off at each side by the "Frenchman." Black putty is made by mixing the white putty with lamp black.

In tuck pointing red pressed brickwork, the stopping is mixed as before and laid on after the brickwork has been coloured one coat; a second coat of colouring is then put on over the stopping, and the putty joints laid on. The colouring is made with Venetian red, with a little brown added if required; it is mixed in a solution of alum to prevent it being washed off, about 5 oz. of alum to a gallon of water.

White and yellow brickwork do not require colouring. The front is well washed and scrubbed to remove lime stains, the stopping mixed to the colour of the bricks, and the putty joint laid on as before. Tuck pointing is most expeditiously done by two men, one at each end of the rule, which should be 6 to 8 feet long. The joints should be perfectly level and parallel to each other, and the vertical joints exactly over each other. The putty joints should not be wider than $\frac{1}{16}$ in. When old work is to be repointed, the joints should be well raked out, the front washed down and scrubbed, the joints stopped, and the putty joint laid on as before directed; the stopping for old work will generally require lamp black mixed with it.

When lime stains cannot be got off by washing and scrubbing, a weak solution of hydrochloric acid and water will generally bring them off.

OIL POLISHING.

BY DAVID DENNING.

To the ambitious amateur, the heading of this article may not be so attractive as if it had been "French Polishing," but let me tell him that this will appear all in good time, and that till it does he will find almost each week something in "Shop" which will be of use to him. At present the simpler process of oil polishing must receive attention; and those who are not so dazzled by the oftentimes meretricious glare of a French polished surface that they can still see something to admire in a comparatively dull oiled surface, it is to be hoped will be able to learn something. There is, though, in treating of oil polishing, after all very little to be said. Patience and elbow grease are still more essential than with wax polishing, for any one who expects to get even the semblance of a polish or gloss within a week or two with the aid of oil will be most grievously disappointed. How long, then, it may be asked, does it take to finish a thing properly with oil? The answer may seem a paradoxical one, for to give it in plain English, it may be said the work is never finished. An oiled surface will always bear more rubbing than it has had, and, to say the least, will not be deteriorated by friction. At the same time a good amount of polish should be got in from one to two months, according to the amount of labour bestowed. This is more than can be devoted to the finishing touches of a piece of furniture generally nowadays, so that it may almost be considered that oil polishing is an obsolete process. Why, then, should the subject be treated on in Work?

Well, it does not follow that because the process is too long to be remunerative in ordinary work it should not be worthy of attention, especially as it has merits which recommend it where speed is not a primary consideration. Its one great advantage is

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that it is much more durable than either French or wax polishes; inasmuch as it does not blister by heat like the former, nor spoil with water to such an extent as the latter, to which in general appearance it may be compared. It is, however, because it does not blister by heat that it is specially useful. We have only to look at an ordinary French polished dining-table top to see the damage caused by hot dishes, plates, etc., laid on it, unless great care has been taken. On an oil polished dining-table top the same hot dishes, etc., might be placed with impunity almost; and bearing in mind what has been said, no one will have any difficulty in understanding that it is chiefly dining-table tops that have prevented oil polishing having become quite extinct. Of course, those who want to polish the whole of a table, or anything else, with oil may do so if they like, but it is usual, even when the top is oiled, to polish the legs and frame otherwise. Now, after all this preliminary talk, the reader, if not discouraged to pursue the subject, may want to know how to oil polish and what materials are used. Linseed oil is the material, the only one in pure oil polishing beyond the rubbers. Occasionally other ingredients besides oil have been recommended, and are used, till it is difficult almost to recognise wherein the distinction between oil polishing and French polishing consists. The two processes may, so to say, be mixed up to an almost indefinite extent. With these, which may be called the advanced forms of oil polishing, we have nothing to do, at present at any rate, as no good purpose could be gained by discussing them, and to do so might only tend to the confusion of the novice. Authorities are found to differ on the quality of oil to be used: some recommending boiled, others raw linseed oil, with various proportions of the two according to fancy. I am, for ordinary work, disposed to favour boiled linseed oil, but in saying this, I do not at all wish to imply that others who differ from me are wrong, so that if any would-be oil polisher has a penchant for something else, or some fancy mixture of boiled and raw oils, by all means let him use it. The procedure is very much the same. It consists in rubbing the oil well into the wood, not saturating or flooding this, but scrubbing it, and then rubbing long and hard. The process may be repeated almost indefinitely daily or at intervals till a polish which is deemed sufficient appears. To give an example, take a table top: rub some oil well into it, and then polish with a rubber formed by wrapping some baize, felt, or similar material round a brick or other suitable block, the object of which is, by its weight, to some extent to relieve the polisher. The rubbing should be continued till the surface of the wood is dry. The only perceptible difference in the top will be the darkened appearance caused by the oil, as little or no gloss will appear at first. By repeating the operation, however, the polish will come up gradually, and a surface which in the opinion of many is superior to that of French polish will be the result.

From what has been said, it will be seen that oil polishing is hardly suitable for anything but plain work, on account of the labour required. It must not, however, be forgotten that any piece of work can be polished so, if only the necessary time and labour be given to it. Even when it is not deemed practicable to bring up a polish with oil, a very pleasing finish may be given to a piece of work by merely rubbing it with oil. The colour is enriched to an extent which would perhaps hardly be credited by those who have not had frequent opportunities of seeing wood in the white and oiled. In choice mahogany especially the improvement is very marked. Light oak is also greatly improved in tone, so much so that it may be questioned whether young fretworkers who are not proficient in French polishing would not be more satisfied with the appearance of anything they have made if they were simply to oil it, instead of what to an experienced eye seems too often very like spoiling it by giving it a coating of shellac, alias French polish.

A WALL BRACKET WITH CARVED SQUARE PILLARS.

BY J. H. MOODY.

A FREQUENT contributor to WORK, whose writings I always read with interest and benefit, once aptly compared the weekly programme of our magazine to a *menu*, and referred severally to the papers therein as "joints" and "sweets," accordingly as they treated of plain joinery or of work of an ornamental character. Pursuing the same simile, I now compare the columns of "Shop" to the salad which usually completes the list of good things; hence, to my mind, it follows that our Editor is the authority whose hand administers oil or vinegar to the ingredients of the salad in proportion as they need qualification. Now, judging from the selfish tenour of some of the communications published in "Shop" from time to time, one would imagine that those critics who display so much sourness need a particularly lavish administration of oil to mollify them, but happily their mollification is not necessary, for approving testimony predominates.

Perhaps disapproval will greet this article, and the dissatisfied ones may find fault because these pages are occupied by such a trifle as the appended illustrations represent, but I will not fear the rancour of adverse opinion if the disciples of the art wherein enamel paint plays a conspicuous part approve of my contribution, and welcome it to the catalogue of handsome things destined to become more handsome beneath their deft fingers; for notwithstanding that the pretty fancies put forward as suitable to be treated with enamel paint are already numerous, yet I think my bracket will be found to possess good points, worthy of imitation.

I notice that some establishments offer for sale articles of various kinds and designs made in white wood, especially for the benefit of those who delight in enamel decoration; but I notice also that these articles are put together in the simplest methods of joinery, and are made of material selected regardless of unsightly knots and other blemishes; it may be that price is a consideration in the production of them, but I fail to see how they assist the operator or can give good result, and I doubt whether the medium which is said to beautify everything can redeem the crudeness of that which is cheap and nasty.

I am free to confess that I began this bracket, Figs. 1 and 2, with rather indefinite ideas. At first, I had in view the utilisation of some odd bits of turnery that my store contained—preserved, as is my custom, against their ultimate appropriation—but as the design developed, my ideas were resolved into a style wherein turning would have no place, so I put the pieces into store again, and resigned myself to the style into which I had drifted; this was without any feeling of regret on my part, as I achieved a result eminently satisfactory to myself. I realised that bold scrolls and flowing curves associated with carved square pillars made a very harmonious whole, and the preliminary sketch gave me every hope that the finished bracket would be a charming object if properly constructed.

The adoption of square work in the pillars will be especially agreeable to those who for certain reasons, unnecessary to mention, wish to be independent of turning, and the carving of such pillars is not a difficult matter, while they are exceedingly effective in appearance.

The chief points to observe in devising such a piece of ornamental furniture as this bracket are, without doubt, symmetrical arrangement of outline and selection of harmonious detail—all, of course, in keeping with the style chosen, and if in either particular the design be deficient, the one offence condemns the entire work; my care, therefore, was to avoid incongruities and aim at perfection of design. To this end I made the different parts of my bracket to agree with each other; as regards proportion, for instance, I was careful that the projection of the shelf on either side beyond the centre compartment should not be too great, likewise that the commencement of the cornice should not be placed too far above the shelf, as the addition of a pediment on such terms would make the whole thing top-heavy; I determined also the depth of the work beneath the shelf to accord with the proportions of the parts above it.

It may seem superfluous to mention these matters, but I can vouch that due observance of them is of no small importance, and saves considerable trouble and probable disappointment.

In commencing this job, if you intend to leave the wood in its natural colour and eventually polish it, choose your material from walnut or Honduras mahogany as straight grained as possible, and without a particular amount of figure. For the requirements of enamel painting, pine will do, avoiding, of course, all pieces containing knots or shakes.

Cut from ¾ in. stuff a piece 1½ in. wide, and long enough to give, when equally divided, the two styles of the back framing. Next, from the same ¾ in. stuff cut another piece 2 in. wide, and long enough to cut the top bar and the lower bar of the framing. All these pieces must be dressed up smooth and square: they can then undergo another stage of preparation, and be got ready for joining together severally as bars and styles, which means that tenons must be cut upon the short bar to fit in mortises cut upon the styles, and the long bar be cut with laps to fit corresponding laps cut also in the styles. The styles and long bar are halved together by means of these laps.

Before gluing up this back framing, the styles and bars must be scratched with a couple of reeds near to the edge of the square opening, which will appear when the four pieces are placed together. Reference to the sketches will enable the workman to determine the position of the joints that I have here described. The rectangular space between the four pieces of the frame requires now to be fitted with a panel. This panel is cut from thin wood, and pierced with a circular opening just large enough to contain the diameter of the circular mirror. Provision must be now made to secure the mirror at front, for which purpose another

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piece of thin wood must be cut to the shape as shown in the drawing, and pierced also with a circular aperture, the diameter of which must be rather less than that of the mirror. This second thin piece of wood is bevelled upon its edges, and when glued upon the first piece in proper position, provides a rebate for the mirror's reception.

A mitred moulding (Fig. 3) fitted exactly between the four pieces of the back framework makes the rebate for the panel. To fasten this moulding in place, I used needle points, as they can be driven in far enough to hold the parts, and they conveniently break off rather under the surface of the work after being struck two or three times by the hammer; their place of entry then becomes nearly hidden by the closing up of the fibres of the wood.

The scrolls and bracket pieces which create the outline and fill up the corners in the back frame above and beneath the long bar are made from the same thickness of wood as was used for the back itself; they do not call for any especial mention, saving that they are cut out with the proper saw, and are dowelled on to the styles. The scroll-work curtain filling up the space under the long bar and between the styles may be of much thinner wood than the parts just mentioned, and it were best cut with the grain running downwards. It must be tightly wedged between the two styles, and should have a piece of the same thin wood glued upon its back across the grain, and also three-cornered pieces glued into the angle at each side to give it strength.

This completes the construction of the back of the bracket, and after the shelf (Fig. 4) is cut to shape and reeded, it can be fastened in position by screws driven through the long bar from the back. The top piece can also be cut to proper size and fastened in its proper place by screws driven through it into the top bar.

The pillars (Fig. 5) being next taken in hand, I will mention that the carving upon them can be accomplished with a dovetail saw, and with one or two chisels and files of various shapes; a very valuable auxiliary will also be found in a templet cut from cardboard, showing the outline of one side of a pillar. This templet can be applied at different stages of the carving, to show the workman when and where his work requires correction.

The drop terminals beneath the shelf are fashioned by the same methods as the pillars, and pillars and terminals are connected by dowel screws passed through the shelf. The pillars are held at top by ordinary screws driven through the roof-piece.

Mention must also be made of the curtain pieces of the canopy, which are fixed between the square part of the pillars in front and between the pillar and the style at either side; they are of the same

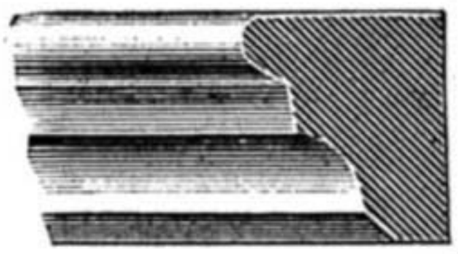


Fig. 7.—Moulding on Pediment (full size).

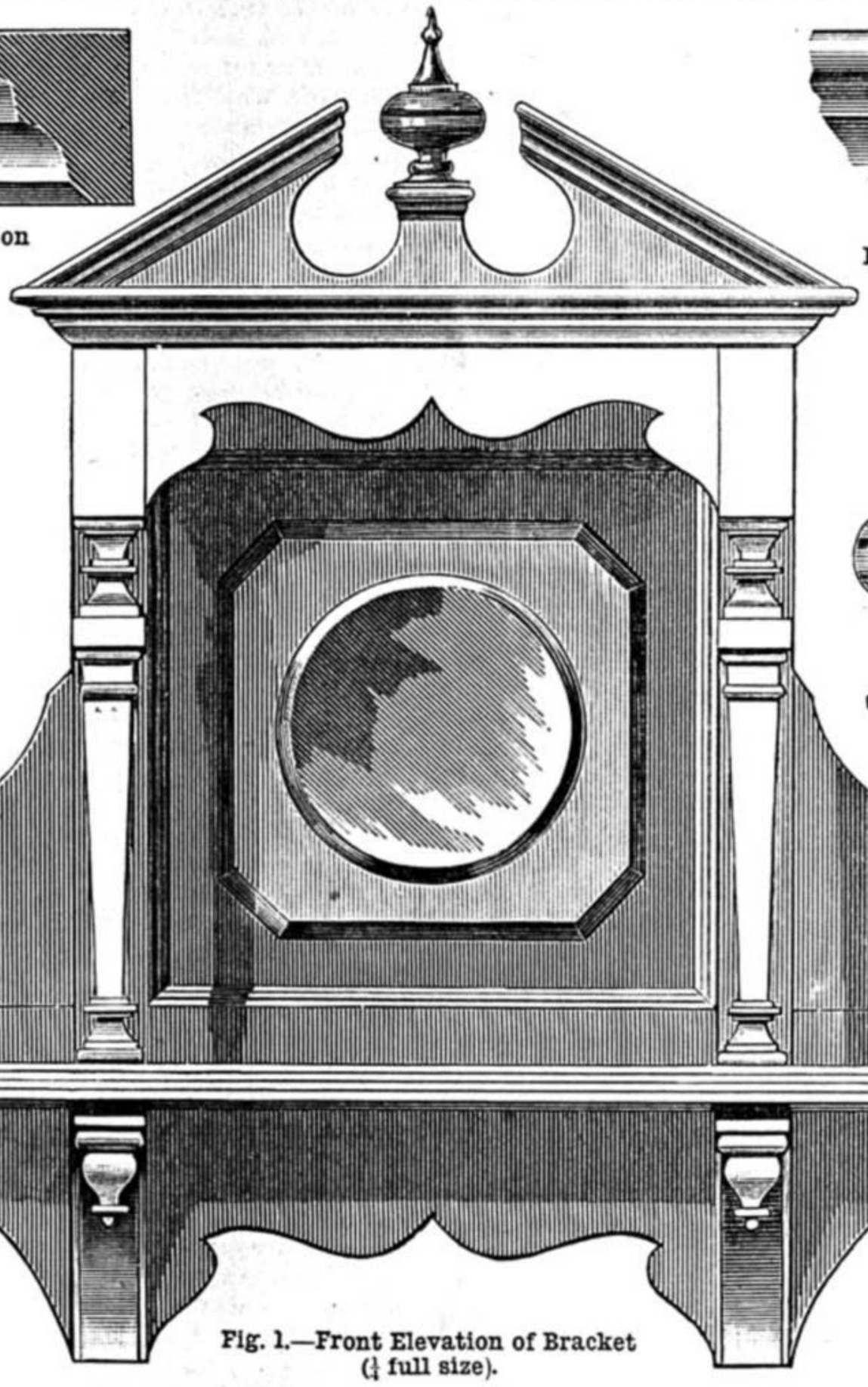


Fig. 1.—Front Elevation of Bracket (¼ full size).

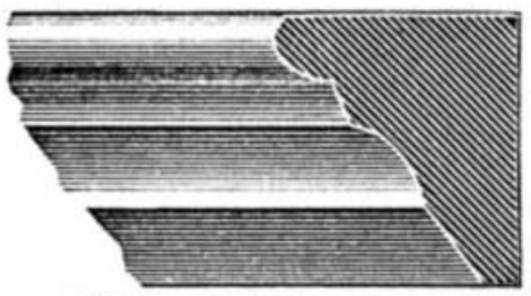


Fig. 6.—Moulding of Corner (full size).

Fig. 8.—Knob on Pediment.

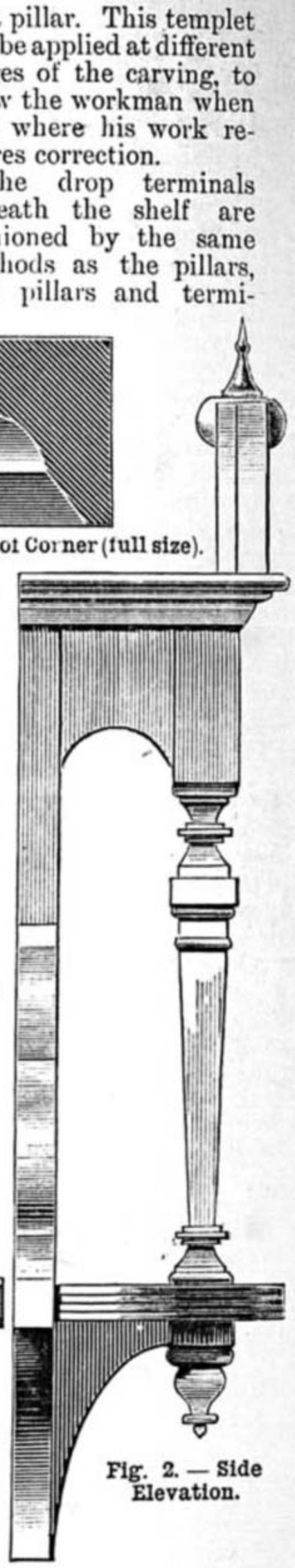
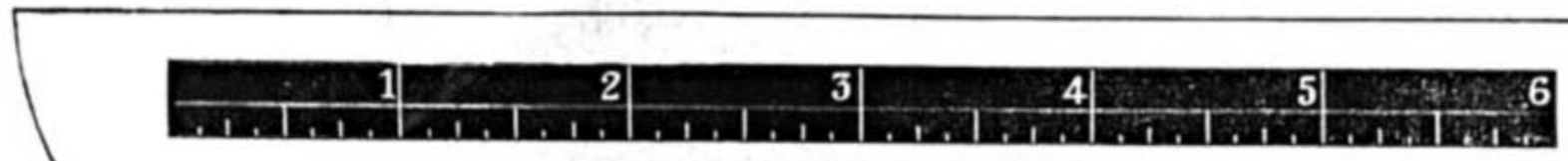


Fig. 2.—Side Elevation.



Scale of Inches for Fig. 5.

Fig. 4.—Shape of Shelf.

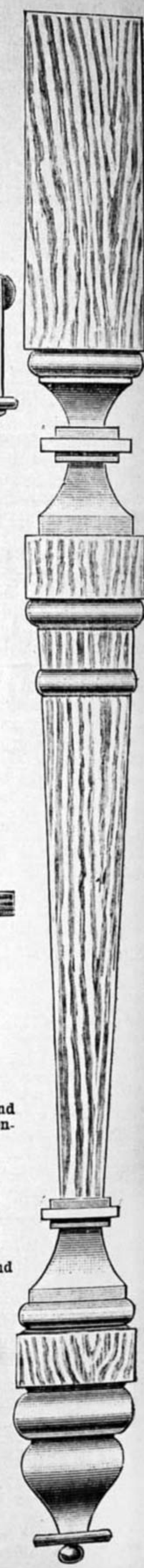


Fig. 5.—Pillar and Terminal: enlarged.

Fig. 3.—Moulding round Panel (full size).

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thin wood as the curtain piece below the shelf, and they are strengthened in the same way by pieces glued across the grain at the back.

The brackets below the shelf at front are simple in form, and are screwed from the back on to the styles; in size they should each be large enough to fit exactly between the style and the drop terminal, and if this is carefully done, the terminal, which appears to be a continuation of the pillar through the shelf, will also look as though it were part and parcel of the bracket piece behind it.

Now comes the cornice (Fig. 6) for consideration, and I have no doubt that he who constructs the bracket satisfactorily up to this point will also be perfectly qualified to make the moulding of which it is comprised; the fixing of it upon the top piece is but simple mitreing.

Above the cornice is the pediment: this is to be made of ½ in. stuff, and fastened to the top flush with the front edge and behind the moulding. Note particularly the shape of this pediment, and take care that the portion which divides it is drawn correctly in the centre. The moulding (Fig. 7) upon it will be seen to be not so wide as that of the cornice, and the completed pediment will be fixed above all by means of three-cornered blocks glued into the angles at the back. The knob, or finial (Fig. 8), must be obtained accordingly as there are facilities at hand. In order to buy such an one as represented, it will not be necessary to search very far into the region of the Bethnal Green Road; there are many turners in that neighbourhood who keep a stock of them.

The bevelled mirror I was lucky enough to be able to purchase cheaply from a dealer in odds and ends, but I imagine that circular silvered plates are kept pretty constantly in stock. However, the constructor need not be disheartened if he fail to obtain a mirror suitable; the alternative of painting a group of flowers in monochrome upon the panel will be quite admissible, and will have a pleasing effect; in fact, had I not been fortunate enough to obtain the glass, I intended to adopt that plan myself.

PRACTICAL DETAILS OF BOOKBINDING.

BY GILBERT CLARKSON.

ROUNDING AND JOINTING—TURNING-UP, OR CUTTING WITH PLOUGH—PRESSING.

THE rounding of a book is an operation which cannot be well described, it has to be seen to be understood. It is true the back is beaten with a flat hammer held in the right hand, but at the same time the fingers of the left are not idle, they have as much to do as the hammer, and the rounding is only successfully accomplished when both hands perform their part.

Having rounded the book, it will be necessary to joint it (according to trade parlance). This operation is performed by placing the backing boards on each side of the book at equal distances from the back. The whole is carefully put into the laying press, the lower edge of the boards being even with the cheeks of the press, which must be screwed up as tight as possible. With the hammer the back is beaten firm and round, which causes the boards to make a groove by the projecting over of the part left above. This is a long, tedious operation in a big job, and many a blister has been raised on the binder's hand, and many a time in the course of a day he (like the girl in the song) will have to wipe his hot brow. But, thanks to the engineer, this need not be, for there are now backing machines, which not only lessen the labour for the workman, but also lessen the expense for the employer. Messrs. Furnival and Co., and Messrs. John Greig & Sons, manufacture these machines (Fig. 19). They are very compact, taking up but little floor space. They can be easily adjusted from one size to another. A steel roller does the work of the hammer, and it has only to be brought once over the back of the book from one side to the other. It makes a much better joint than is possible with the hammering process.

When books are bound in cloth and other cheap styles, the edges are generally cut with the guillotine. Indeed, almost all cutting is now done with the machine. We cannot afford to cut books with the plough, the prices are *cut* so low. Hence the plough is very seldom used, and there are actually binders who, although good tradesmen, cannot *turn up* a book (this is the trade term for cutting a book with the plough).

Books that are intended to be turned up are treated a little differently from those that are cut round with the machine. While they are drying, after having been glued up, it is usual to look out and prepare the boards for them. The boards are first cut roughly to the size wanted, with the lever millboard cutting machine (Fig. 19 A), and lined with paper on one side; this has a tendency to draw the board and make it lie to the book. After the boards are lined, the books are rounded and jointed, and the boards when properly dry are squared and cut to the exact size for the books. They are then laced in, *i.e.*, the bands on which the book has been sewn are laced through. Two holes are made in the board opposite each band. The slip is first passed through to the inside, then brought out through the other hole. The slip will have to be well scraped and pasted before lacing. The proper time for scraping the slips is immediately before waste-papering the books. After this operation is complete, the slips are cut off close to the board and beaten well into it by placing the inside on an iron (called the knocking-down iron) fixed in the laying press, and beating on the outside with the hammer. This must not be done slovenly, as much of the beauty of the binding depends upon it.

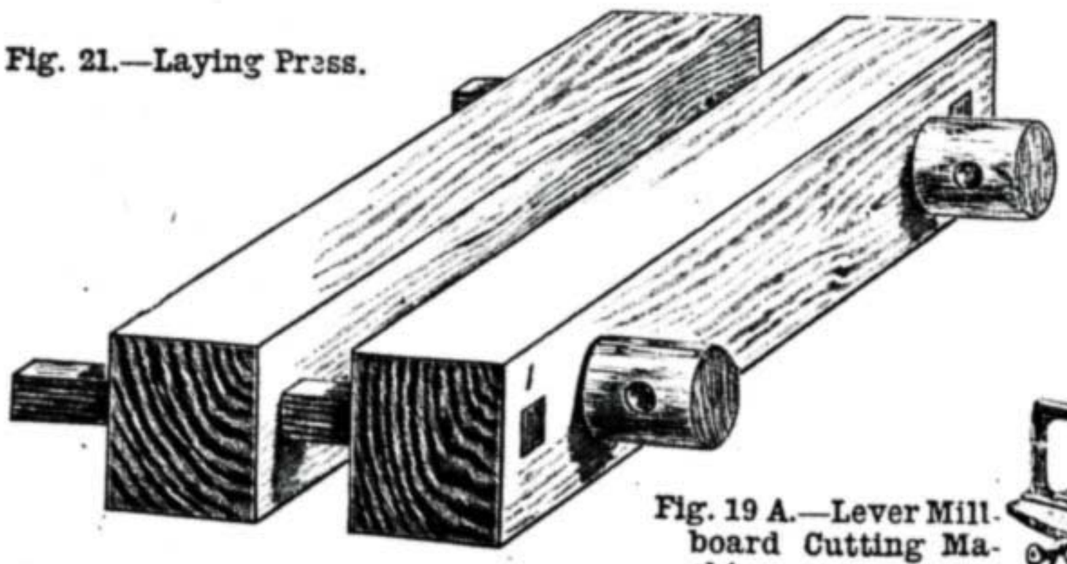

Fig. 21.—Laying Press.

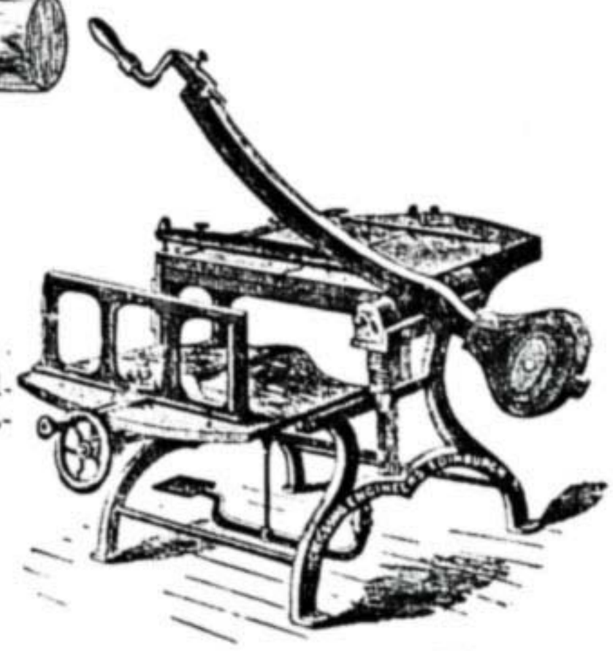

Fig. 19 A.—Lever Millboard Cutting Machine.

Fig. 20.—Cutting with the Plough.

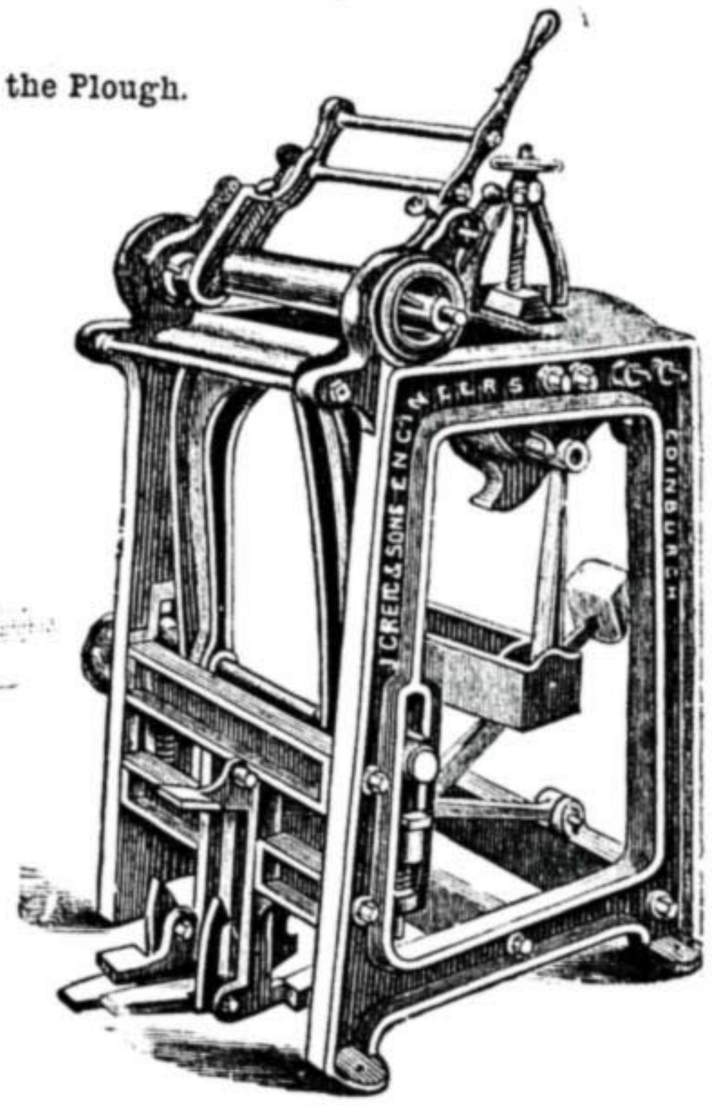

Fig. 19.—Improved Book-Backing Machine.

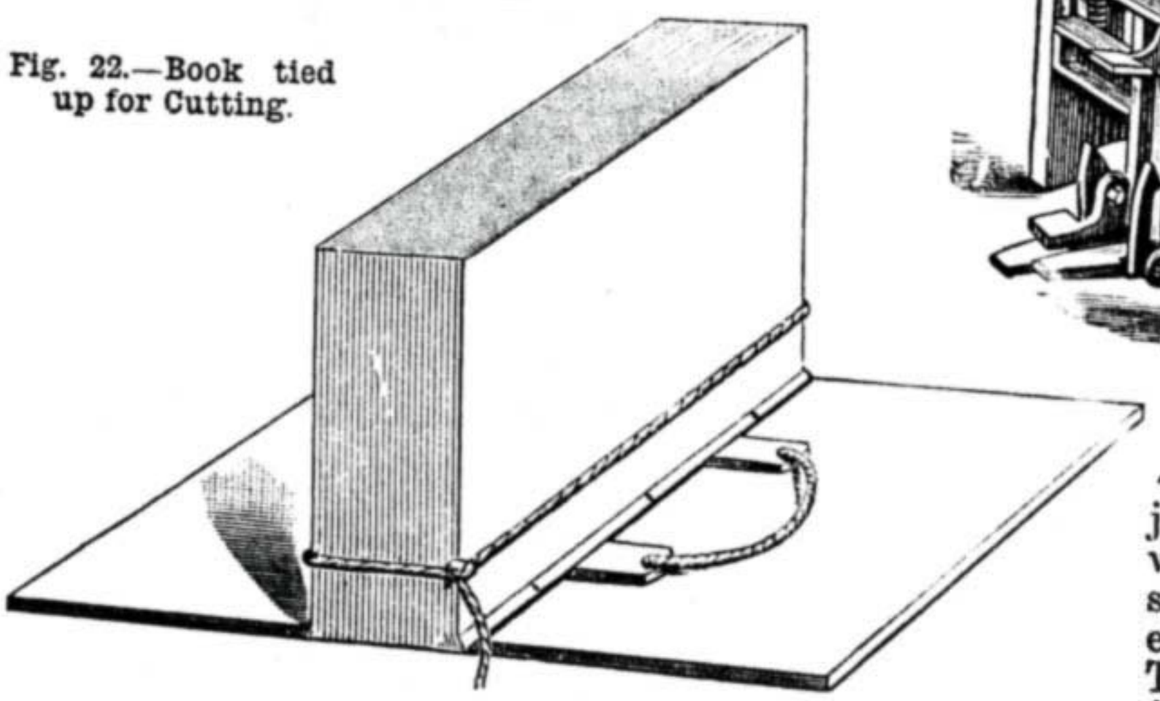

Fig. 22.—Book tied up for Cutting.

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It does not add to the appearance of the binding to see great lumps along the joint underneath the leather.

The binder who knows his business will now put his books "in the press." And if he is a careful workman he will press them with tins—he will put a sheet of tin or zinc between the board and the book, and on the outside of the board if he can get a sufficient number of tins for his "parcel;" he will at least put a smooth pressing-board between every book, and build them carefully in the press. He must needs build them carefully, for if his parcel is a big one and the books of different sizes (as they are sure to be), when he is applying the pressure the books may bulge at the centre and fly out of the press altogether. I have seen this happen more than once, and on one occasion I had a very narrow escape from a flying board. When the books are in the press, and the pressure applied, the backs are "washed off." This is the boy's job, and he is sure to be called to it when the bell is ringing for stopping time, and the poor wee fellow growls out—"Why can't you have yer books in sooner?" However, he has got to do it, and he proceeds thus—he pastes the backs well over with rather thin paste and allows them to steep a few minutes, then scrapes them with a blunt stick, then lifts a handful of shavings, dips them in water, and washes all clean and smooth. The books are left in the press to dry.

In cutting books with the plough (Fig. 20) it is very important to have them square. If they are the least bit out at the head, the tail will present the same defect as it is compassed from the head.

The head of the book is always cut first, taking off as little as possible—the right-hand board is drawn down and the volume placed in the press with the back towards the workman. Some binders dispense with cutting boards, and leave the left-hand board to cut against, but the safest plan will be to use the cutting board. The book must be screwed up tight in the laying press, (Fig. 21), the plough taken with the head of the screw in the right hand, and the other end in the left, and worked backwards and forwards in the groove, the knife gradually advanced through the book by turning the screw gently, which should be all one way, as the workman's arms are advanced from his body (Fig. 20).

When the head has been cut, the book is taken out of the press and looked over for the shortest leaf, so that the proper quantity may be taken off the tail. It is again put in the press and the cutting proceeded with as for the head. In cutting the fore-edge, open the boards and tie the leaves with a piece of cord round the head and tail to prevent them returning after the back has been made flat. This done, knock the back flat on the press. Two strips of steel, called "trindles," are generally kept for this purpose; they are passed between the back of the books and the boards (*see* Fig. 22). They are taken out as the book is placed in the press. After the fore-edge has been cut the string is taken off, and the back resumes its rounded form; the fore-edge in consequence has a grooved appearance.

All this may appear simple enough, but when the reader comes to put it into practice he will not find it, as I have said, quite as easy as it may appear from the description. It will be better for an amateur even to pay a small sum to a friendly and sympathetic bookbinder that he may see the operation performed.

OUR GUIDE TO GOOD THINGS.

*** Patentees, manufacturers, and dealers generally are requested to send prospectuses, bills, etc., of their specialities in tools, machinery, and workshop appliances to the Editor of WORK for notice in "Our Guide to Good Things." It is desirable that specimens should be sent for examination and testing in all cases when this can be done without inconvenience. Specimens thus received will be returned at the earliest opportunity. It must be understood that everything which is noticed, is noticed on its merits only, and that, as it is in the power of any one who has a useful article for sale to obtain mention of it in this department of WORK without charge, the notices given partake in no way of the nature of advertisements.*

46.—Bell Centering Punches.

To avoid loss of space by repetition and prevent loss of time to my readers and myself by unnecessary correspondence, let me say that all the tools and appliances mentioned in this page are submitted for notice by Messrs. Moseley & Son, 323, High Holborn, London, W.C. The Bell Centering Punch shown in Fig. 1, a full-size illustration of the appliance, is a handy and useful tool that is indispensable to every engineer, machinist, and turner. It enables any one to instantaneously centre any geometrically shaped article for the purpose of drilling or turning. In use the punch is held up right over the article to be centred, and the punch centre slightly tapped with the hammer, when the true centre is instantly marked, and may be deepened by an ordinary centre punch. The price of the larger punch in Fig. 1 is 3s. 6d. These punches are very accurate, and are made of the best material and well finished. Their capacity, outside measurement, is $1\frac{1}{16}$ in., and weight 5 oz. They are made by the Cushman Manufacturing Company, Hartford, Connecticut, U.S.A. The smaller punch, of which the lower part only is represented, has a capacity of $\frac{7}{16}$ in. outside measurement, and is intended for jewellers, clock makers, etc. Its price is 2s. It consists of a steel punch working in a guide of the same material, with a bell-shaped mouth. The punch is held up by a steel spring. It is surmounted by a neat ebony handle, which brings up the entire length of the appliance to $4\frac{1}{2}$ in.

Fig. 1.

Fig. 2.

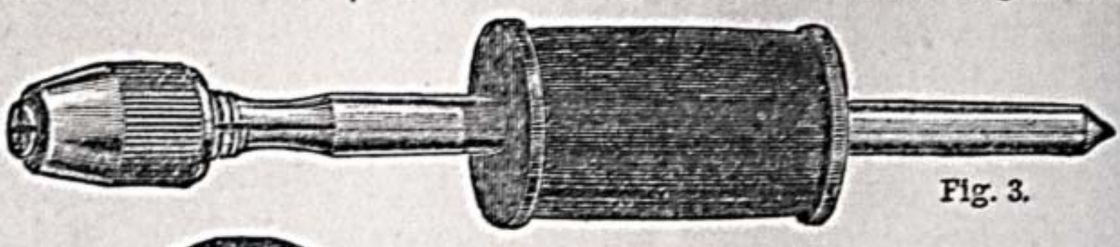

Fig. 3.

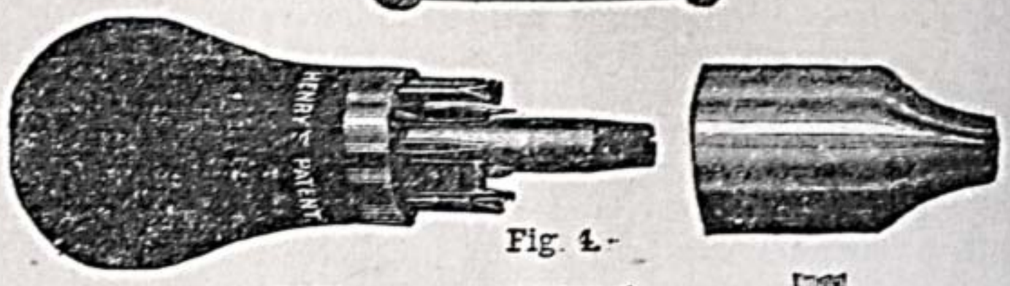

Fig. 4.

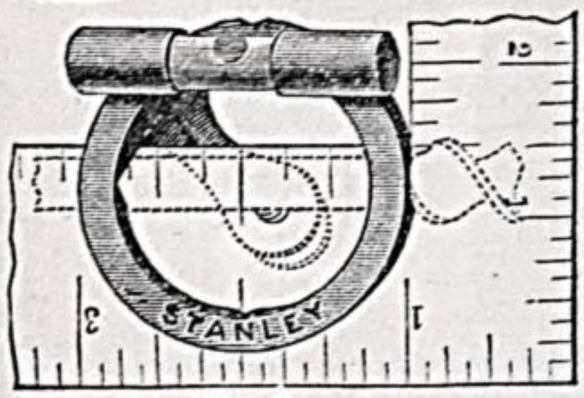

Fig. 5.

Fig. 6.

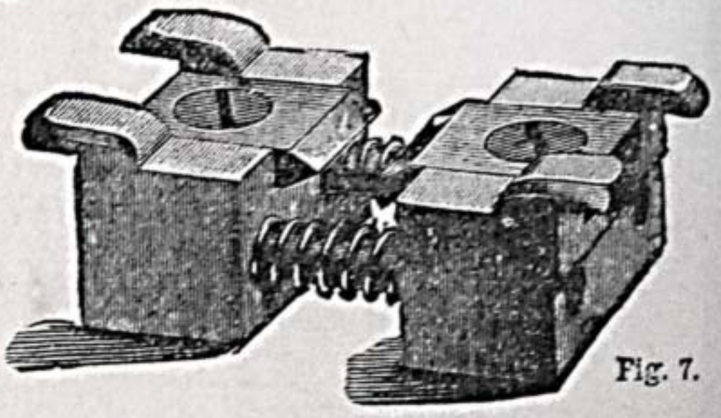

Fig. 7.

Figs. 1, 2.—Bell Centering Punches. Fig. 3.—Clock Drill Stock. Fig. 4.—Henry's Patent Combination Haft. Figs. 5, 6.—Stanley's Bit and Square Level. Fig. 7.—King Vice Cutting Tool.

47.—Screw-Cutting Stock and Dies—Bauer's Patent.

This is a new and powerful stock with six dies for cutting screws of $\frac{1}{4}$ in., $\frac{5}{16}$ in., $\frac{3}{8}$ in., $\frac{7}{16}$ in., $\frac{1}{2}$ in., and $\frac{5}{8}$ in. in diameter. The stock is made in the usual way as far as the handles go on either side, and its length from end to end is very nearly 18 in. The centre, which is $4\frac{1}{2}$ in. long by $2\frac{1}{8}$ in. wide, presents on one side a central circular hole $\frac{7}{8}$ in. in diameter, flanked by two hexagonal-headed screws $\frac{3}{8}$ in. in diameter, which enter the stock through holes pierced for their reception. These screws enter the centres of two discs of steel, $1\frac{3}{4}$ in. in diameter and nearly $\frac{1}{2}$ in. thick, which are cut or tapped on the circumference in six places to the depth necessary to cut screws of the diameters named above, and revolve in circular recesses sunk in the under side of the stock for their reception. When a screw is to be cut, the corresponding cutting parts in each disc are brought opposite to each other in the centre of the stock, and are fixed in position by tightening the screws with a wrench. The operation of screw cutting is then proceeded with in the usual way. The price of this screw-cutting tackle, made as described on Bauer's Patent, is 16s. A set of twelve best taper and plug taps to be used with the stock is supplied for 14s.

48.—Clock Drill Stock.

This handy drill stock for jewellers, watch and clock makers, etc., has its form so clearly shown and its purpose so plainly illustrated in Fig. 3, that it needs but little description. It is $4\frac{3}{4}$ in. in length, and is fitted with a reel-shaped ebony pulley for actuating the drill by a bow and cord. There is a split chuck at the bottom for the reception of small drills, which is tightened or relaxed by the milled screw, which works by means of an internal thread up and down the threaded surface of the chuck. Its price is 2s. 6d.

49.—Henry's Patent Combination Haft.

This well-made pad and set of twelve tools, manufactured on Henry's Patent by Messrs. J. Britton & Son, Stoughton, Massachusetts, U.S.A., will be best described by stating the advantages that are claimed forth over others by the makers. It is the only tool holder that carries the tools in the same end of the holder in which they are used. There is no shifting the holder end for end in changing the tool, nor shaking the tools out into the hand to get the one wanted.

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The same motion that unscrews the instrument in use removes the cap covering the tools that are not in use. No wrench is required, and the rosewood handle is solid, and may be struck, if necessary, with a mallet. The tools are held in a split chuck, as may be seen in Fig. 4, and the cap, which is shown removed in the illustration in order to exhibit the tools and chuck, is of brass, nickel-plated. Its price is 3s. 6d.; its length 4¼ in.

50.—Stanley's Bit and Square Level.

It is difficult to name a more useful pocket appliance for the sum charged for it, namely, 1s. 6d., than Stanley's Bit and Square Level. It is, as may be seen from Figs. 5 and 6, a circle of brass 1⅝ in. in diameter, $\frac{3}{16}$ in. wide, and ¼ in. deep, carrying a small level carried in tubular projections springing from the upper part of the casting. Behind is a projecting arm, with a screw with a milled head passing through its outer end, which serves to fasten it to any tool to which it is desired to attach it. The frame or ring has three pairs of v slots or notches on the back by which boring can be done with perfect accuracy as to vertical or horizontal borings or borings at an angle of 45° by observing the air bubble in the level when turning the bit. The frame can also be attached to a carpenter's square, as shown in Fig. 5, by letting two shoulders which project from the back rest on the top of the horizontal square, thus rendering it an accurate spirit level, and the upright leg of the square will then indicate an exact plumb line. Its application to a boring bit in a horizontal direction is indicated by dotted lines in Fig. 5, and to a bit in a vertical position in Fig. 6. Its price, enclosed in a small box, is 1s. 6d.

51.—Combination Shears for Cutting Metal and Wire.

I find in this lot of tools and appliances a pair of excellent shears for cutting sheet metal, which will be found useful and serviceable by all who are engaged in sheet metal working on a small scale. The shears are 8 in. long, with blades 2⅜ in. long, and the loops at the ends of the respective handles are large enough, the one to take the thumb up to the second joint, and the other the tops of three fingers. Projections on the top of each blade, just above the screw on which the parts work, form powerful nippers for cutting wire. The price of the shears is 3s.

52.—King Vice Cutting Tool.

Every one who is possessed of a vice should provide himself with one of these useful adjuncts to that appliance, as it will be found to be the best cutting tool yet produced for cutting bolts, wire, keys, rivets, etc., as it will operate effectively on rods ¼ in. in diameter. There are, as may be seen from the illustration of the tool in Fig. 7, two cutter blocks, with shoulders projecting from the upper and outer corners by which the tool rests on the jaws of the vice when dropped in between them. One of these blocks is free, and slides on guide rods fixed in the other, the two blocks being kept apart when not in use by spiral springs coiled round the guide rods. In the top of each block is fixed a powerful cutter, with a wedge-shaped edge. The cutting edges cannot be forced against each other, this feature being provided for in the determined length of the steel guide rods projecting through the free block and coming in contact with the opposite jaw of the vice, which thus provides a positive stop. The length of the tool is 3⅛ in., the width 1⅝ in., and the depth, not including the lugs, $\frac{7}{16}$ in.; the width of the cutting blades being ¾ in. The cut is made simultaneously from both sides, and is clean and without burr or ragged edge. The jaws of the vice employed should open to the extent of 2⅛ in. to enable the tool to be dropped in between them and used with effect. The parts are interchangeable, and new cutters can be fitted when necessary. The price is 3s. 6d.

53.—Hibernia Drill Chuck.

This is a strong and powerful drill chuck made for the lathe by Messrs. Marples & Sons, Sheffield. It is 5⅜ in. long and ⅝ in. in diameter at the mandrel end, and $\frac{7}{16}$ in. at the opposite end, in which the expanding jaws of the chuck, furnished with v grooves on the inner side, are inserted. This end is deeply screw-cut for 1¾ in. to take the massive cap, 1¼ in. wide at the widest part, by which the jaws are gripped on the drill or tool that has been placed between them. The price of the chuck, which is well-made and nicely finished, is 3s.

54.—New Combined Blowpipe and Fire Chamber.

This is a new kind of blowpipe, differing from any yet brought into the market, because every ordinary blowpipe acts on a flame altogether independent of it, while in this the fire is contained in a chamber formed by a cap placed on the end of the pipe. The pipe itself is of brass, fitted with a white metal mouthpiece. It is about 8½ in. long, including mouthpiece, and is bent at the other extremity, so as to present a short arm about 2½ in. long at right angles to the longer arm, the bent part, of course, taking the form of a quarter of a circle. At the end of the short arm is a cup-shaped chamber, through which the extremity passes, terminating in an end having a pin-hole aperture. Round this end is placed some wire gauze, which forms the bottom of a circular box $\frac{7}{16}$ in. deep and ⅝ in. in diameter. In this is placed a piece of sponge saturated with spirits of wine, which is kept in place by a thimble-shaped covering, with an opening at the top ¼ in. in diameter, that fits tightly over the box. The spirit is ignited, and the blowpipe is then used in the ordinary way. The price is 2s. 6d., or 2s. 9d. post free. The Editor.

SHOP:

A Corner for Those who Want to Talk It.

NOTICE TO CORRESPONDENTS.

*** *In consequence of the great pressure upon the "Shop" columns of* Work, *contributors are requested to be brief and concise in all future questions and replies.*

In answering any of the "Questions submitted to Correspondents," or in referring to anything that has appeared in "Shop," writers are requested to refer to the number and page of number of Work *in which the subject under consideration appeared, and to give the heading of the paragraph to which reference is made, and the initials and place of residence, or the nom-de-plume, of the writer by whom the question has been asked or to whom a reply has been already given. Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

I.—Letters from Correspondents.

Simple Spirit Lamps for Soldering, etc.—E. H. (*Brighton*) writes:—"I use an empty watertight brass cartridge case (as thrown away by the rifle volunteers). Twist a piece of copper wire tightly round it and form a handle like a candlestick, stuff the empty case lightly with cotton wadding, then fill with as much methylated spirit as the wadding will take up; fit a cap to prevent the spirit evaporating when not in use. For a copper bit, I get a piece of clean copper wire, dip an inch in killed spirit, then hold it in the flame of the lamp with a bit of blowpipe solder. With these and a small blowpipe I can solder everything that is too small for a tinman's bit, and a good deal more too."

Fairy Bells.—A. G. (*Cardiff*) writes:—"I notice in page 95, Vol. II., that J. H. S. (*Walthamstow*) states he has a fairy bell with twenty-six strings, and as he has kindly offered to give any further information required, I wish to ask if he will oblige me with the number of strings he has, of each size of wire."

Cutting Mitres.—Post Office Box (*Richmond, Va., U.S.A.*) writes:—"Before leaving England in April, I was inquiring for a handy machine for cutting mitres on picture framing. A friend, an excellent amateur carpenter, advised me to have nothing to say to the ordinary mitre-cutting machine, but to trust to the 'shooting board,' page 188, Spon's 'Mechanics' Own Book,' and the plane, for mitreing moulding. He explained that the great difficulty in keeping the knife true in a mitre-cutting machine renders it unfit for use by any one but a skilled mechanic. So far I have been unsuccessful with the shooting board and plane; the mitres turn out fairly true with the saw, but the plane, however keen and fine set, chips the gilt off the edges of the moulding at the joint. Am I badly advised as to the shooting board? Will someone kindly let me know their experience in picture framing."

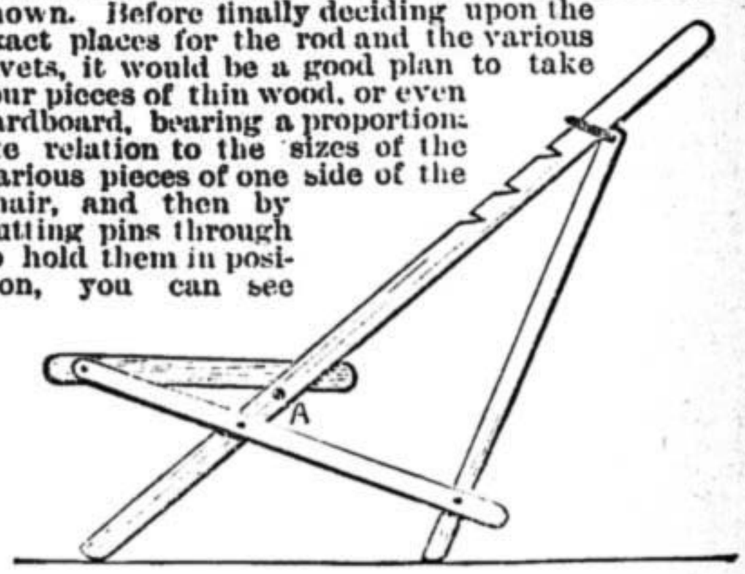
China and Glass Drilling and Riveting Tools.—F. T. (*London, N.*) writes:—"It might be helpful to your readers to know about the price to pay for a thoroughly good outfit of drilling and riveting tools for China:

	s.	d.
Drill	5	0
Two diamond bits	5	0
Side cutting pliers	1	9
Half-round wire, two sizes ...	1	0
Small hammer	1	0
	13	9

II.—Questions Answered by Editor and Staff.

Insulated Wire.—Magnet.—Your query is wanting considerably in detail, and shows a want of knowledge in the subject at issue. However, I fully understand what you want to get at. Wind your coil exactly in the direction given in your sketch taken from "Science for All," and couple up your battery according to the directions given in Work for February 15th, and you will have the North Pole at your right hand.—W. D.

Garden Chair.—Chair.—I think the accompanying sketch will make the thing clearer to you, and perhaps help you out of your difficulty. Instead of riveting the back ends of the seat rails to the back legs, put a ½ in. iron rod right through both legs at A, and allow the back of the seat to rest upon it, as shown. Before finally deciding upon the exact places for the rod and the various rivets, it would be a good plan to take four pieces of thin wood, or even cardboard, bearing a proportionate relation to the sizes of the various pieces of one side of the chair, and then by putting pins through to hold them in position, you can see



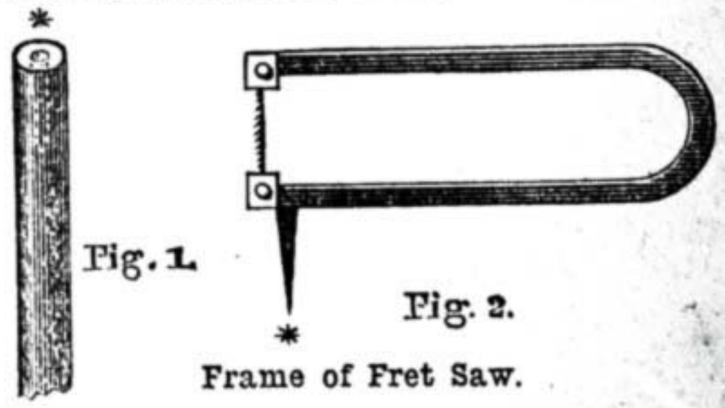
Garden Chair: position of Iron Rod.

better how your chair will work when finished, and so decide upon the exact spot to insert your rivets. Perhaps this is not very clear to you; if not, look at the sketch and try to imagine that you are looking at four slips of thin wood, instead of finished chair legs, and that the rivets shown are your pins, and I think you will catch on to the idea. A model of this sort often serves to bring one out of a difficulty, and I would recommend you to adopt it whenever you can find it practicable, as it saves a lot of thinking.—G. le B.

Polishing Silver-plated Articles.—J. T. (*Carlisle*).—If there are scratches in the deposits of silver after it has been scratch-brushed, it shows either that the wires of the brush are too coarse and hard, or that the articles were not polished before they were placed in the plating vat. If the articles were smoothly polished before being plated, the fault must be in the brush, and you must use one having finer wires. All scratches in the surface before plating are reproduced in the silver coat. A note on burnishing is already in the Editor's hands.—G. E. B.

Gramme Dynamo.—G. E. S. (*Berkeley*).—I should advise you to get a set of castings with the F.M. cores, 2 in. by 1½ in., and wind these with 6 lbs. of No. 22 double cotton covered copper wire. Do not get laminated punchings for such a small machine, as you will find these troublesome to fix and wind. Get a solid Pacinotti cogged armature (3½ in. × 2 in.) with your castings, as part of the set, and wind this with 1½ lbs. of No. 22 double cotton covered copper wire. Connect the armature coil in shunt with the F.M. coils. If you run the armature at a speed of 2,500 revolutions per minute, you should be able to light up from three to five incandescent lamps of 10 c.p. each lamp. You will find more details in my forthcoming articles on "Model Electric Lights."—G. E. B.

An Easily-made Fret Machine.—E. F. (*Battersea*).—You ask me how to fix the frame of saw on gaspipe. I do not think that I can make it much plainer than what I said in page 332, Vol. I. Drive a piece of beech, or any similar hard wood,



Frame of Fret Saw.

in the top of the gaspipe, and in the wood bore a small hole, as Fig. 1. In this hole knock in the point of the frame, Fig. 2, and see that you get the under side of the frame square with the pipe, or else it will always have a slanting stroke.—W. R. S.

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Spokes.—J. W. B. (*Oldham*).—Spokes are not, and cannot be, turned in the ordinary lathe. A wheeler will sometimes place a spoke in a lathe whilst he is dressing one side, then give it a turn round with the other hand, and finish dressing the other side off. Most of the spokes you see in wheels on light carts are either hand or machine-dressed ones. Spokes in heavy carts and larries are always dressed by hand labour, and made of English oak. The machine-dressed spokes, which come in large quantities from America, are invariably of hickory. In large coach-builders' shops a spoke-dressing machine is kept, but would take up too much space in "Shop" for me to describe it; but ready dressed spokes can be bought so cheap that a wheeler is not necessitated to buy a machine. These, however, can be procured from Messrs. Whittingham and Wilkins, Long Acre, London. Instructions how to make and dress spokes will be given in the papers on wheel-making.—W. P.

Patent.—W. L. N. (*Birmingham*) should examine the specifications of the patent which he fears may interfere with his trade, and ascertain how much ground it actually covers. As he does not want to make watches, it may be that his alarm is needless. The specification may be bought from the Patent Office, or he can see it for nothing at a Patent Library. As he is a Birmingham man, he had better go to the Patent Library, Corporation Buildings, Birmingham.—C. C. C.

Sheet-Iron Tanks.—CONSTANT READER.—If your tanks are not thick enough to caulk light, you can proceed somewhat as you say. Prepare a very thick paint of red lead, white lead, boiled oil, and terebine; make it as thick as treacle; coat the laps well with this mixture and also a strip of canvas and place it between the two; you will not be able to draw the rivets through two thicknesses of stout sheet iron; you ought to punch all holes by a gauge before attempting to put together. Your holes should be fairly close together—about 1¼ in. from centre to centre.—R. A.

Brass Polishing.—ARGUMENT.—The following description will give you an idea how brass work is polished. The machine shown in Fig. 1 is for use where steam or other power is employed, and is speeded up to 2,000 or 3,000 revolutions per minute (the greater the speed the better the polish obtained). The screws C on the ends of the spindle are cut the reverse of each other, so that when the spindle is running (they always run towards the operator) the resistance caused by the work which is being polished tends to screw the bob on the spindle. It is fitted with fast and loose pulleys. The spindle should be made of steel, and bearings should not be less than 4 in. wide, because the high speed and sand working in wear them away quickly.

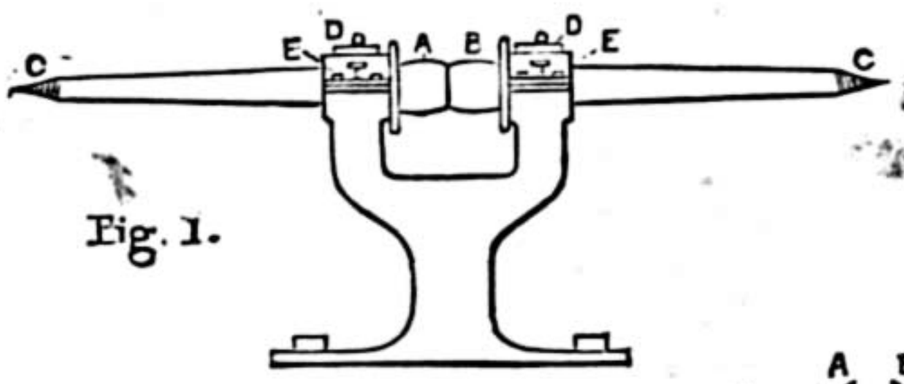

Fig. 1.

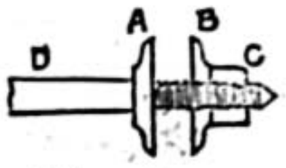

Fig. 2.

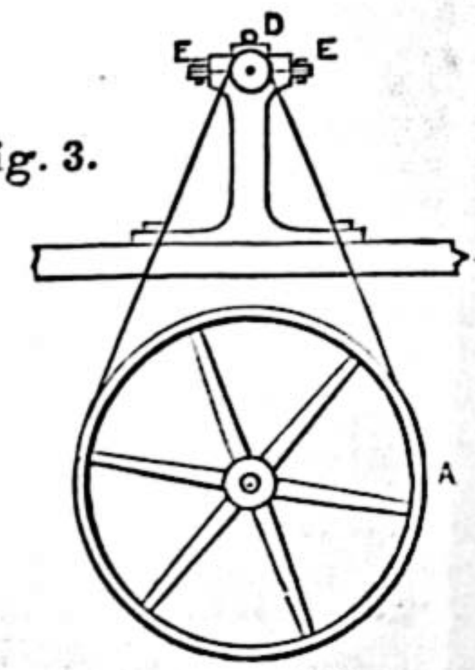

Fig. 3.

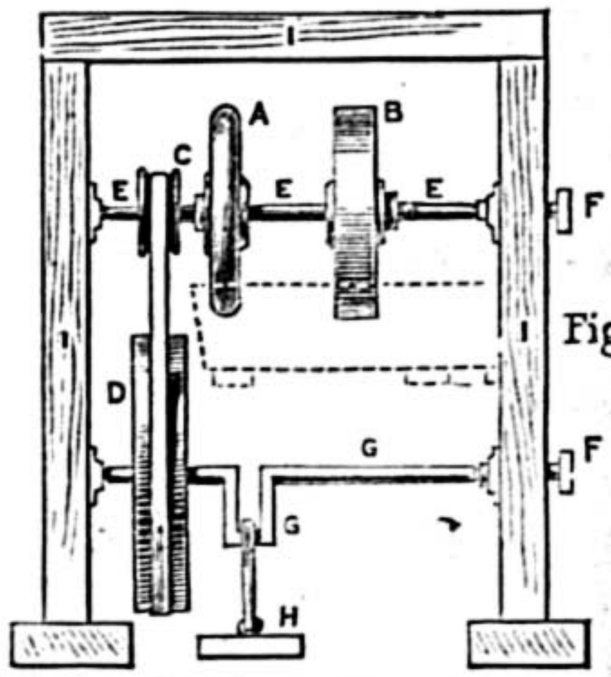

Fig. 4.

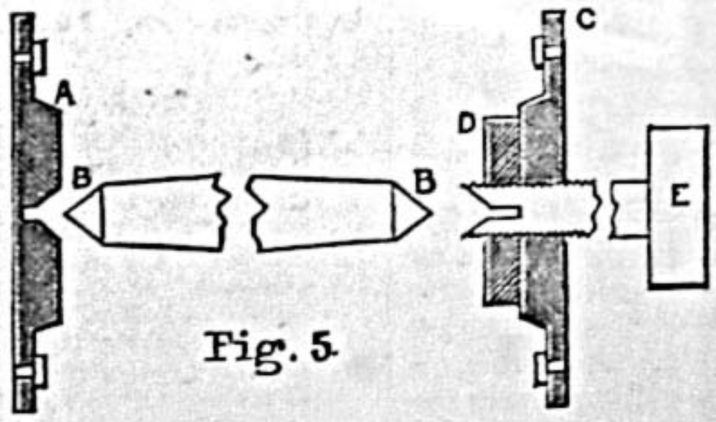

Fig. 5.

Polishing Machines. Fig. 1.—A, Loose Pulley; B, Fast Pulley; C C, Tapering Ends of Spindle cut with a Rough Thread; D D, Oil Boxes; E E, Adjusting Screws for Bearings. Fig. 2.—Alternative End of Spindle—A, Fast Collar; B, Loose Collar; C, Lock Nut; D, Spindle. Fig. 3.—Method of Driving Spindle—A, Driving Wheel; D, Oil Boxes; E E, Adjusting Screws. Fig. 4.—Another form of Machine—A, Round Face Bob; B, Flat Face Bob; C, Pulley; D, Driving Wheel; E E E, Spindle; F F, Adjusting Screws for Spindles; G G, Crank and Driving Spindle; H, Treadle; I I I, Framework. Fig. 5.—Enlarged Section of Spindle Ends and Bearings in Fig. 4—A, Plate with Taper Hole; B B, Ends of Spindles tapered to fit Plate, etc.; C, Plate for other End, screwed; D, Lock Nut; E, Adjusting Screw fitting in Plate C.

Fig. 2 is another arrangement for fixing bobs to spindles, and is used with wooden wheel bobs, which are described further on. The mode of driving these spindles is shown in Fig. 3. A is the driving wheel fitted to a shaft, which runs under the bench on which the spindle is mounted, the top of the bench being used to hold the polishing sand. Fig. 4 is a good substitute where steam power is not used, and from which fairly good results can be obtained. The sketch shows the general construction of it. Approximate dimensions are—height from bottom to top, 4 ft. 6 in.; outside width, 3 ft. The framing is made from 6 in. or 8 in. by 3 in. wood; the bobs are fixed on spindle in similar manner to that shown in Fig. 2, and can be made of various shapes on the face, according to work. Fig. 5 is an enlarged section of bearings of spindles in Fig. 4. Plates A B should be about 2½ in. by 1½ in. by ⅜ in., made of iron, with a steel face, and hardened. Plate A should always be made with a drill hole at the bottom of countersink; also the end of adjusting screw E must be made in the same manner; the object of it is that the points of spindle B B shall not be worn down, also spindle will run easier. Points of spindle and adjusting screw must be steeled and hardened; the harder the better. The materials used for polishing are bobs, mops, sand, crocus, Sheffield lime, and rottenstone. The bobs used on Fig. 1 are made from walrus and seahorse hides, bull's neck, and from felt. The leather bobs are best, and vary in size from 1 or 1½ in. by ½ in., to 6 or 8 in. by 1½ in. The wooden wheel bobs previously mentioned are discs of wood turned true and the face covered with leather; either of the above three kinds are suitable. The leather is fixed to the wood with glue and wooden sprigs, such as used by shoemakers, the leather being first soaked in water to make it pliable. When the leather is dry, the bob is again turned true. The bobs are of the kind used in Figs. 2 and 4, and are made of various sizes, 8 in. to 12 in. being the most usual; the large size would be used in Fig. 4. Mops are made by a large number of pieces of calico being fastened together, and are of various diameters and thicknesses. They are used in Fig. 1 for colouring up the work. The sand used is called Trent sand; it can be procured in the rough or prepared. To prepare it, it is first pounded in a mortar, then run through a fine sieve; the finer the sand is made the better will be the work. The sand is then mixed with oil, just sufficient to keep it together, so that it cannot be blown away in dust. Sheffield lime, crocus, and rottenstone, are used for colouring purposes. Sheffield lime is, I think, the best, it keeps the mop cleaner and cleans the work better than the other two. When polishing, the work is applied to the bob at an angle, so that the sand held in the hand may trickle down between it and the bob. After being done with the sand it has a dull, greasy appearance, but this is removed in being coloured on the mop. The crocus, Sheffield lime, or rottenstone, is applied to the mop as occasion requires (experience shows when), and adds lustre to the work. Work done on a machine as shown in Fig. 4 has not so good a finish as that done on a power spindle, but a good polish can be obtained with care. When the article has been done with the sand, a piece of brass or steel should be held against the bob to scrape off the sand; then apply rottenstone or one of the other compositions to the bob and colour off. The dotted line in Fig. 4 is a box about 6 in. deep, in which the sand is kept. The sand can be cleaned from embossed or figured work by being soaked in petroleum and then brushed with a soft brush; the articles should then be dried out in warm sawdust, rubbed over with some clean old rag, and lacquered if required. There are many firms in your city who supply polishing requisites: Messrs. J. E. Hartley & Co., St. Paul's Square, and Mr. W. A. Carlyle, 48 and 50, Constitution Hill, are two of them; I have also seen spindles in Messrs. R. Lloyd & Co.'s, 135 and 136, Steelhouse Lane, and in the second-hand shops in the same street, but second-hand articles are not always the cheapest. Leather and felt bobs are sold in a shop in Steelhouse Lane, but I forget the name of the firm.—BRASS.

Sweaty Hands.—S. W. (*Camberwell, S.E.*).—I am sorry that I do not know of any remedy for this. It is constitutional, and you ought to consult a medical man; it is dangerous to apply anything that will stop perspiration; the cause of it must be removed. You might try drying your hands after washing in oatmeal or bran, and rub occasionally in either whilst at work; this may rectify it a little.—R. A.

Bronzing.—C. H. G., C. B. G., NEMO, and others.—The following recipes and instructions collected from various sources will give these querists the information they require. Browns of various shades may be produced on brass articles by immersing them in a solution of nitrate and iron. Violet, by a solution of chloride of antimony. Chocolate, by burning on the surface of the brass moist red oxide of iron, and polishing with black lead. A good green can be produced by treating on brass as follows: make a solution of 1 oz. bichloride of mercury in 1 pint of vinegar; brush the articles well with this, and whilst wet dust on black lead thickly and polish; lacquer with green lacquer composed of one part lac varnish or shellac, four of turmeric, and one of gamboge dissolved in methylated spirit. Steel grey may be produced by a diluted boiling solution of muriate of arsenic. Blue can be produced with hyposulphite of soda. Antique green bronzes may be obtained by alternately washing with diluted acetic acid and exposing to the fumes of ammonia, or by boiling in a strong solution of nitrate of copper. Another method is by washing the metals in a liquid made of 10 grains sea salt, 10 grains cream of tartar, 10 grains acetate of copper, and 30 grains carbonate of soda dissolved in 4 fluid drams of vinegar. G. B. G., who inquired particularly about steel bronze, might try some of the metallic enamels; steel ardenbute, made by T. Pavitt & Co., is very good; it is sold at most ironmongers' and colourmen's at 6d. per bottle, and, I believe, Aspinall makes a similar thing. For steel for concertina reeds I should try some of the steel pen manufacturers at Birmingham and elsewhere.—R. A.

Silvering Bicycle Parts.—W. E. B. (*Hull*).—(1) Your correspondent means, I think, how to silver plate or nickel plate. It is needless for him to attempt this without a somewhat expensive plating plant, and considerable experience in using it. If he means only to plate parts of his own tricycle the idea is absurd, he would get them done for a few shillings. If he means to try it himself he will spend five or six times more for the necessary plant and will not be able to do it then. (2) "How to Nickel Plate, E. and F. Spons' Recipes." London.—A. S. P.

Wheel Gearing.—G. R. (*Durham*).—Taking your wheels Nos. 1 and 3 at 4 ft. diameter, and wheels Nos. 2 and 4 as 6 ft. diameter, then axle No. 4 will make sixty-four revolutions to one of wheel No. 1, so if the latter makes four revolutions per minute, a 6 ft. wheel on axle No. 4 will be travelling at a speed of 5½ miles per hour. I do not think you can get enough power in a "hand crank" to do this work. On an ordinary road you would require about half a horse power to keep the speed up.—F. C.

Hand Power Hoist.—NEMO (*Bradford*).—For your hoist, you should put the hauling rope pulley direct on the axis of the worm, and the worm wheel upon the barrel shaft; the multiplication of power will be 22 to 1 to raise 6 cwt. and overcome friction. The hauling rope pulley may be 20 in. diameter, and its groove may have radial notches in its sides to prevent the rope from slipping. The worm should then be 1½ in. pitch, and the wheel it gears will have twenty teeth, which will bring its diameter to 9½ in. nearly; the winding barrel (or pulley if that is used) should then be 18 in. in diameter. The screw is to be 4 in. in diameter, then it will be self-sustaining in any position, the angle of thread to axis being obtuse enough to prevent the worm from being driven by the worm wheel. These dimensions will give velocities as 22 to 1 between the hauling and lifting ropes. The worm shaft should nowhere have a less diameter than 1 in., and the barrel shaft, on which the worm wheel is keyed, must not be less than 1½ in. in diameter. No cog wheels are necessary in this construction. I should advise you to inquire the price of such gear before making it; you may find it cheaper to buy it.—F. C.

Gravity Daniell Battery.—C. F. T.—The directions for charging this battery were quite correct, and you have followed them faithfully. I think you must have omitted to amalgamate the zinc, hence you got a film of zinc oxide and finely divided copper on the zinc element (this was the powder sent me for analysis), and this resisted all further action. The solution must not be disturbed at all after the battery has been set up.—G. E. B.

Slot Guard.—J. C. (*Penge*).—The invention is ingenious, but I am afraid too complex to become a commercial success. The battery is rather an

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objectionable feature as being liable to fail, and for any portable apparatus it would be very inconvenient.—F. C.

Staining Furniture.—J. H.—The wood may be stained yellow—a most unusual colour for furniture—by using a solution of picric acid. If this is not sufficient, write again.—D. D.

Tool Contrivance.—J. D.—No special contrivance is required to turn washing machine rollers. Your lathe is, of course, provided with a T rest, and it may be presumed you have the ordinary tools for doing plain work. Beyond these nothing is absolutely necessary but skill, which can only be acquired with practice.—D. D.

Oak Varnishing, etc.—H. A. (*Hackney*).—If you find that the varnish has sunk into the wood, give another coat. You will, however, save varnish by first sizing the wood. Apply the size with a brush and do not varnish till dry. The best varnish to use depends on circumstances, for you would naturally not use the same on a piece of carving as on work out of doors. As you do not say anything about this, all I can do is to advise you to ask at the oilshop where you deal which is the best for your purpose, whatever it may be. You cannot do better than read WORK, including the "Shop" columns, for information about polishing. Individual inquiries are answered and difficulties met there, and no book on the subject can do more than deal with generalities.—D. D.

Musical Glasses.—MUSICAL.—A full set of musical glasses should consist of twenty-five, that is, two octaves, but any number may be used, either more or less, the difficulty increasing the larger the number, and growing smaller the fewer, used. The glasses should be as nearly as possible of the same height. Champagne, port, or claret, if of good flint glass, and cut, not cast, give excellent results. It requires some amount of time and patience, not to mention expense, to get a complete set and well in tune, although the latter may be adjusted by partly filling the glasses with water. No rule can be given for selection, glasses of apparently the same size, thickness, and height varying in pitch to the extent of several notes; this must depend, therefore, upon the ear; generally, however, it will be found that thin glasses give a deep, and stout ones a shrill, tone. Having selected the requisite number, place them upside down on a board, leaving a space of ¼ in. clear between the edges. They should be in two rows, the "natural" notes in the front row, and the "sharps and flats" in the second row, thus:

C♯D♯ F♯G♯A♯ C♯D♯ F♯G♯A♯
C D E F G A B C D E F G A B C

Measure 1½ in. from the outside of these, and from this measurement cut your baseboard, which should be of ¾ in. pine. On this board fasten each glass by three wooden clips, or buttons. It will not be necessary to make three for each glass, as some will fasten down two each. They should be of ⅜ in. stuff, and be lined on the under side with soft leather to make them grip firmly on to the stands of the glasses, and also minimise the risk of breakage. Some prefer to sink each glass into the baseboard the thickness of its own foot, and then screw the buttons on level; but having tried both methods I have come to the conclusion that the former is the best, as by it you can more easily replace a glass, and there is no risk of the foot being too large, as the buttons can easily be adjusted to any difference of size. Sides and ends should be now fitted to the baseboard and hinged so that they will all fall outwards when the glasses are required for use; and in addition a lid should be hinged to the back, in the centre of which a falling handle should be placed. The whole should be raised on four feet about an inch high.—R. F.

Noisy Tremulant in Organ.—J. W. H. (*Holmwood, Co. Down*).—Probably your tremulant requires the pallet recovering with leather, so as to deaden the sound when in action. If you have room, it can be enclosed inside a box lined with felt, which will still further deaden the sound. Another alternative is to remove it entirely from the organ and place it in a cupboard at some distance from the instrument, or in the next room, conveying the wind to it by a 1½ in. tube. It will answer just as well as when fixed on the instrument itself, and can be fixed where it can be easily got at when required. As it acts on both "choir" and "great organ," probably there is only a single soundboard for both manuals.—M. W.

House Agency.—HOUSE AGENT.—Appraiser's and House Agent's licence is set down at £2. It, and all information with regard to it, may be obtained at the nearest Money Order Post Office. We are given to understand that a person may simply let houses without a licence, but he must not let furnished houses of more than the annual value of £25 per annum, or make any valuation between outgoing and incoming tenant. In short, without a licence he can never extend his business far. In the writer's district, the usual commission on collecting rents is 5 per cent.—S. W.

Lantern Slides.—H. C. T. (*Holloway*) asks, "Is it the negative that forms the slide, or is the picture printed? Do the plates have to be exposed any longer than for an ordinary photograph?" In answer to H. C. T., I would refer him to WORK for the 6th of March, where I described the method of printing lantern slides. I would here briefly say the negative is not used, but a plate printed from it. The exact time taken for printing will have to be determined by experiment, as the plates of different makers vary in sensitiveness. I think H. C. T. will find the information he needs in the answer I have referred to. If not, write again and state difficulties more fully, and I will endeavour to answer.—O. B.

Dressing Table, etc.—ANXIOUS TO KNOW.—There is not sufficient space at my disposal to treat of these articles so fully as I should like; therefore, should there be one or two points rather blunt, you will know the reason. As, however, you only ask for designs, perhaps you do not need the little I do say. You do not ask for anything elaborate, so I have given you ordinary

Dressing Table.

patterns. Refer for drawer making and joinery to "Some Lessons from an old Bureau" (page 113, Vol. I.); and for table top to "Lining up" (pages 210, 234, Vol. I.). These are meant to be 3 ft. 6 in. long each. The drawers will run on mortised and tenoned frames, either left clear or filled in by a board of thin stuff, in the same manner that a slate is encased within its frame. For making the plinth refer to "Combination Bedroom Suite," "Coal Box," or some other of the numerous articles in WORK. You will also find some serviceable

Washstand.

hints in "A Small Sideboard." In corners of plinth, glue and screw small blocks underneath for further strength, to which to attach castors. Width of pedestals, inside plinth, 13 in.; width of opening, 15 in. The heights range from 28 in. to as much as 31 in. You will find 29 in. the most convenient. Sides of table (measuring on plinth) about 18 in. Each drawer under table top will be a trifle larger than the one above it; you can easily calculate the sizes, allowing 4½ in. for plinth and ¾ in. for each division. The same thickness will suit for sides. Jewel boxes will be about 11 in. wide, and 10 in. or 11 in. high, and 8½ in. or 9 in. from back to front. Divisions and sides for them will do of ½ in. stuff. The glass frame will be about 17 in. by 24 in., exclusive of mouldings and pediment. I have purposely placed brackets, in preference to turned columns (the latter will not be so firm), for the support of the glass frame, which will swing by means of a movement to be obtained at any cabinet brass founder's. Washstand will be the same height. Get the marble from any mason's, and let him bore a few holes through it, by means of which the tile-back, etc., can be screwed on. Six tiles, let into a rabbet and secured by a thin board nailed behind, will be required. Legs to be turned from 2¼ in. stuff. I would say more, but space will not permit. Buy an Index of WORK, Vol. I.—J. S.

Horse-Power of Pumping Engine.—E. H. M. (*Thackley*).—The friction of a fairly good pumping engine and pumps should not exceed twenty per cent., and upon this basis your questions are solved as under:—

To raise 60 cubic feet of water 30 fathoms (=180 ft.) per minute:—

60 cubic feet.
62·3 lbs. per cubic foot.

180
120
360

3738 lbs. weight.
180 feet lift.

299040
3738

672840 foot lbs. net work.
20 per cent. 134568

807408 foot lbs. gross work per minute.

$\frac{807408}{33000}$ = 24½ horse-power (nearly).

The other questions are solved in the same way, and, as our space is limited, I merely give the results, noting that 33,000 foot lbs. per minute is one horse-power. To raise 50 cubic feet 20 fathoms, 13½ horse-power; to raise 20 cubic feet 10 fathoms, 2¾ horse-power; the total power required is 40½ horse-power.—F. C.

Application of Electricity to the Cure of Disease.—W. W. (*Patterdale*).—I write as experience dictates. Although I have suffered very much from neuralgic pains and nervous weakness consequent upon indigestion, and have tried magnetic belts and electrical appliances, I have not experienced any benefit therefrom. In my circle of friends there are others who have had similar experiences, and I do not know of one *cure* effected by galvanic or magnetic belts. I have seen electricity applied in our hospitals for the relief of pain, and as an aid in the cure of certain diseases. Morbid growths may be removed by the electric cauteriser; superfluous hair by an electric depilatory; the action of nerves and muscles may be stimulated by the proper application of a high-tension current, as from a medical coil, and thus proper circulation restored in paralysed limbs; poisons may be eliminated from the human body by electrolysis; but belts are useless for such a purpose. If you will write to me, enclosing stamped directed envelope for reply, telling me all particulars about your complaint (cause, age, habits, work, and any other matters relating to your sufferings), I will advise you how to obtain relief. I shall have something to say about medical coils in my forthcoming articles on "Coils."—G. E. B.

Zither Wire.—W. J. (*Belfast*).—The strings used for the zither consist of steel, brass, gut, and steel or silk covered with copper or silver wire. The first and second melody strings are of No. 8 steel, the third of No. 9 brass wire, the fourth and fifth of steel covered, while of the accompaniment strings, Nos. 1, 3, 6, 8, and 11 are of gut, the remainder being of silk covered. Tutors for the zither, containing a complete scale with method for tuning, can be obtained from Messrs. Chilvers and Co., St. Stephen's, Norwich, who also supply strings, etc.—R. F.

Engine Castings.—A. E. quite depends on type, quality, and number of parts, some being so much simpler than others. From £2 to £3 would be charged for 3½ in. or 4 in. cylinder engine set. The following supply sets: Mills, Sunderland; Lee, High Holborn; Dorrington, West Gorton, Manchester.—J.

Pinholes in Soldering.—E. W. (*Soldering*).—I should say that the cause of the pinholes that you complain of was either withdrawing the heat before the solder had sufficiently flowed on the articles, or some defect in the spelter. What is its composition, and do you buy it or make it yourself? You can do nothing to avoid the pitting caused by throwing the borax on the work; but why throw it on if you are particular about the work? Take up a little on the spatula and apply to the parts requiring it. With regard to the pinholes previously mentioned, if the articles are to be plated there would be no objection to filling them with soft metal.—R. A.

Bookbinding; Monogram in Gold.—A. G. C. (*Tottenham*).—If, as you say, you are a constant reader of WORK, I am afraid that you do not profit much by your reading; for the information which you desire has been given not less than three times. In Nos. 14, 24, and 27, on pp. 221, 381, and 429, you will find detailed instructions for lettering book backs in gold. The same thing applies to stamping monograms or any other device upon book covers. Kindly turn up these pages, and when you have found them, please make a note of it.—G. C.

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Worn Bearings.—A. L. B. (*Preston*).—I do not know of any way of lining worn bearings with white metal. The way I adopt with the class of bearings that I have most to do with—viz., lawn mowers, knife machines, etc.—is to bush them by sweating a thin piece of brass in each of the halves of the bearing, or by filing the bearings down till the sides do not quite touch when placed on the spindle, and then hollowing them down a little with a round file. If the bearings are in one piece, as sometimes is the case, I turn a thin tube of brass, and let in to them. I have generally found these plans to answer very well. Instruction on soldering appeared in Nos. 17, 23, and 32.—R. A.

Magnetising Telephone Bars.—J. T. (*Liverpool*).—I was very much pleased to have your letter in reference to the above, although I cannot understand why you should take exception to the method of magnetising steel bars described by me. By the way, it was T. A. L. who *asked* for the information; he was not describing the method. The description is given over the initials W. D., and, to use a vulgarism, "that was me." I know it is a little difficult to understand the winding of right- and left-hand spirals, and the way to get a desired polarity, but the method given by yourself is exactly what I have sketched. If you look at the diagram again you will doubtless find that this is the case. I am always pleased to receive a letter from any one who shows an interest in what he is writing about.—W. D.

Elephants' Teeth, Working.—J. S. S. B. (*Dublin*).—In "Holtzapffel's," Vol. I., page 139, I find the answer to your question. "The grinders of the elephant are occasionally worked; but their triple structure of plates of the hard enamel, of softer ivory, and of still softer cement, which do not unite in a perfect manner, renders them uneven in texture. Owing to the hardness of the plates of the enamel, the grinders are generally worked by the tools of the lapidary; they are but little used, and when divided into thin plates are disposed to separate, from change of atmosphere, the union of their respective parts being somewhat imperfect. They are made into small ornaments, knife handles, and boxes, which are occasionally imported."—F. A. M.

Rushes for Caulking.—B. S. B. (*Warwick*).—H. Bullard, High Street, Royston, Herts, will supply you with enough rushes to caulk a dozen barrels for 6d., and postage 3d., per parcels post, as they are very light. I cannot give you any information on coopering, except in the use of the rushes, which are generally split and greased before being placed in the joints.—C. H. B.

Camera.—If CAMERA will refer back to No. 13 of this publication, he will see a detailed illustrated article on the subject of camera making. The diagrams given are for a whole plate square camera. For a half plate a little lighter wood may be used, the dark slides being made 6½ in. by 4¾ in., instead of 8½ in. by 6½ in., and the back of the instrument to contain a focussing screen of 6½ in. square, and the rest reduced in proportion. Yes; any size smaller plate may be used than that for which the camera is constructed; the only provision is to have carriers to hold the size of plate required fitting into the dark slide. Undoubtedly the best lens for all-round work is the rapid rectilinear; the portable symmetrical is also an excellent lens.—D.

Painting and Papering.—T. G.—The length of time it is advisable to leave "plaster work," before painting or papering thereon, will vary under different circumstances. Walls finished in "Keen's" or Parian (white, hard-faced cements) can be painted upon in a day or so. Walls finished with a large proportion of plaster in the "skimming" (finishing) coat, may be painted upon as soon as thoroughly dry, but it might not be advisable to fix thereon papers containing pigments, the colour of which is easily affected by lime, for some months. The ordinary "skimming" of small houses consists principally of lime putty, and I expect in your instance this is so. New walls, as soon as dry, are often temporarily coated with distemper, which is tinted with pigments not easily affected by lime, of which lime-blue, ochre, umber, and Venetian red are the most common and useful. Although these colours will stand the lime, I may state that the latter will perish the size contained in the distemper in less than six months. A whole year is the least time that can be safely advised for ordinary plaster walls before being permanently papered or painted. As to "which is best," paint or paper, this, of course, depends on circumstances also. The cheapest paper, worth twice sizing and varnishing, would cost a shilling per piece. The trade charge for supplying, hanging, and varnishing such would be about 3s. per piece, complete. Papering a staircase for varnishing is not a novice's job. You might manage to paint it satisfactorily. The most pleasing colour and treatment for painting the walls would be a light green-grey "filling" (upper portion), and a terra-cotta or Indian red dado colour. This will harmonise admirably with light oak woodwork. "Cream" for the filling would not wear so well, showing discoloration sooner than the above. "Light salmon" would be better, but not so cheerful and harmonious in effect. The cost of painting the walls would be about the same as papering and varnishing same. To make a good job, you must give the upper part four coats (see "Painting a Billiard Room," Vol. I.). The dado should be marked out after the walls have had two coats all over; then, when the filling has had the other two of "green-grey," one coat of dado colour will cover if, as is advisable, you varnish the dado afterwards. As you have succeeded with your kitchen, you may make an attractive job of the staircase. You should paint the cornice with the walls, and finish it by "flatting" same in a few tints of filling and dado colours. A simple dado border and frieze will prove very effective if carefully stencilled with the dado colour (dark terra-cotta) upon the filling, then run a black line between border and dado.—LONDON DECORATOR.

Medical Coil.—J. G. (*Birmingham*).—Look out for a description of a medical coil in the series of articles on "Coils" about to appear in WORK.—G. E. B.

IV.—QUESTIONS ANSWERED BY CORRESPONDENTS.

Pocket Lamp.—E. H. (*Brighton*) writes in reply to W. G. H. (*St. Germans*) (see page 191, Vol. II.):—"I had one of the lamps he mentions some twenty years ago (when a bachelor and in lodgings), and I write to warn him that they are practically useless and dangerous. I gave 1s. for it at a tobacconist's; it is filled with sponge and charged with benzoline, and lighted by a little square percussion cap being struck with a spring; it will burn for about fifteen minutes, but is blown out with the slightest puff of wind. It is a delicate thing to trim and set the cap, and if the cap should miss fire, as is often the case, the operation of taking another cap out of the little box and fixing it in the dark is about as agreeable as groping for the B flat that has disturbed you out of a sound sleep. If you carry the thing in your waistcoat pocket for a few hours the heat of the body causes the spirit to expand and evaporate, and fill the inside of the lid, so that when the cap is struck all the spirit takes fire and makes the metal hot. This in turn drives the spirit out of the lamp at a furious rate, and in the course of a few moments you will, in all probability, be left in darkness with your fingers well burned. If you require a light the vesta is far better, and if a spirit lamp for other purposes, refer to my 'simple spirit lamp.'"

Brazing Band Saws, Wood Mitre Cramp, etc.—A. X. E. (*Nottingham*) writes:—"In page 262, Vol. II., *re* 'Brazing Band Saws,' S. B. (*Nottingham*) writes asking if some reader of WORK would give him instructions how to use Duncan & Mills' brazing machine. In reply I beg to state if you will kindly furnish me with S. B.'s address, or else furnish S. B. with mine, in order that I may communicate with him or *vice versâ*, I shall be very pleased to give him the instructions how to use his machine, personally, if possible, as he evidently lives in or near Nottingham somewhere. Also kindly allow me to point out one or two little errors (as I think) in WORK. No. 51, pages 811 and 812; first, *re* 'Wood Mitre Cramp,' J. S. A. (*Edinburgh*), in describing sketch of above, line 15, says: 'Fig. 3, I think, will explain itself. A is a piece of ¼ in. birch, 2 in. by 1½ in. In the centre there is a hole half way through, into which the point of a screw (a wooden screw before described) fits, and on either side there is a hole for the cord to pass through. B is a piece of the same size which forms the nut of the screw,' etc., etc., etc. What I wish to point out is, that if ¼ in. birch is intended for the thickness of the wood nut, etc., described, I think it is quite inadequate; a piece 2 in. by 1½ in. by ¼ in. thick of good sound birch would be of some use, but wood ¼ in. thick would not hold more than one ring of thread, pitch eight to an inch, which would be very fine for wood."

Mandrel for Lathes.—D. F. (*Glasgow*) writes: "In reply to J. T. (*Walworth*) (see page 159, Vol. II.) I would like to say that I make a speciality of light engineering, and such work as he describes for amateurs, inventors, and others." [D. F., and all other such workers, should in future advertise their addresses in the cheap "Sale and Exchange Column" of WORK.]

Acid Guard.—G. M. (*Cheadle, Staffordshire*) writes in reply to ACID (see page 262, Vol. II.):—"I may state that if no heat is near, gutta-percha tissue over planed boards would render them acid proof; it could be joined by pasting the edge with chloroform, and immediately lapping the other edge over, about 6 in. at a time could be done. If heat would be present, say as high as boiling point, vulcanised sheet indiarubber, about ⅛ in. thick, could be used and joined with rubber solution, the same solution being used to cover tacks employed to fasten it in place; good rubber tube would answer as waste pipe, but should not be too highly vulcanised, and as free from other substances as possible. Arthur Cort, of 27, Lilford Road, Camberwell, London, could supply you with samples of rubber, etc., and methods of using."

V.—BRIEF ACKNOWLEDGMENTS.

Questions have been received from the following correspondents, and answers only await space in SHOP, upon which there is great pressure:—E. H. G. (*London, S.E.*); CONSTANT SUBSCRIBER; J. P. (*Blackburn*); MATCHWOOD; W. H. R. (*Birmingham*); G. M. (*Clapham*); J. L. & Co. (*Birmingham*); A. M. (*Cromarty*); ALKAME; F. A. C. (*Appledon*); E. A. P. (*Doncaster*); G. B. (*Accrington*); RETAW; H. S. (*Stoke Newington*); W. J. J. (*Belfast*); NOVICE (*Manchester*); PHONOGRAPH; TICH; H. J. M. (*Pembroke Dock*); W. J. P. (*Gospel Oak*); R. R. W. (*Manchester*); W. W. (*London, S.W.*); W. A. A. (*London, E.*); F. C. H. (*London, S.E.*); A. W. (*Edinburgh*); F. S. (*Kidderminster*); W. E. W. (*London, W.C.*); H. L. (*Torquay*); M. P. B. (*London, E.C.*); E. E. (*Chelsea*); R. G. (*Leamside*); J. R. M. (*Walton*); J. M. (*Middlesborough*); A. B. (*Northampton*); J. W. B. (*Hunslet*); G. M. (*Port Ellen*); F. B. C. (*Liverpool*); E. J. C. (*King's Cross*); C. J. W. (*Bury St. Edmunds*); W. C. (*Heckmondwike*); W. J. P. (*Gospel Oak, N.W.*); W. H. (*Plymouth*); K. AND D. (*London, E.C.*); J. M. P. (*Nottingham*); W. C. (*Birmingham*); ROLLO.

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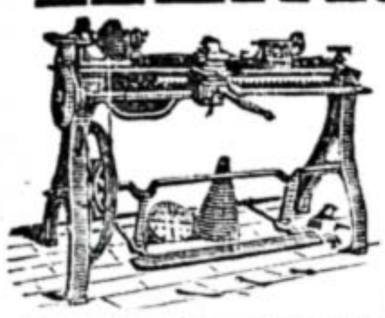

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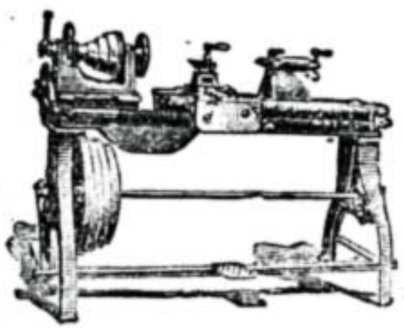

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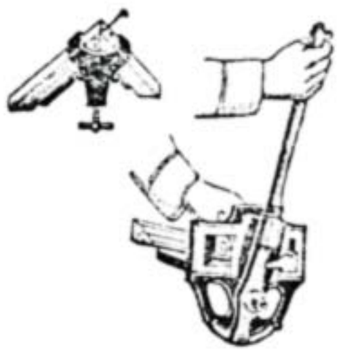

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